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INDIAN MEDICINAL PLANTS



BY

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Habitat:—Tropical North-West Himalaya; Terai of Oudh and Kumaun, Deccan Peninsula, from Rajmahal southwards; also in the hot lower hills.

A large shrub, or scrubby tree, erect or climbing, says Brandis; usually suberect, says Kanjilal. Branches smooth, grey; branchlets pubescent. Leaves opposite, simple, entire, 4 by 2½ in., shortly acuminate, widest near the base, subcordate, or the upper ovate or elliptic, young, hairy and often tomentose on both surfaces, nerves distinct beneath, lower divaricate. Petiole ½–¾ in. Flowers white, fragrant, in lax terminal trichotomous compound cymes, usually 10-20 flowers, not dense; bracts ½ in. linear; pedicels ¼ in.; Calyx-lobes 5-6, as long as or shortly longer than the tube; Corolla-lobes ¾ in., lanceolate acute, 10 or 12, as long as the tube. Berries one or two, ovoid, often oblique, ½–¾ in. long by ¼–⅓ in. broad, unsymmetric ellipsoid, generally of one carpel, black when ripe.

Use:—The juice of the leaves is used, with pepper, garlic and other stimulants as an emetic, in obstruction of the bronchial tubes by viscid phlegm. Seven leaves will furnish a sufficient juice for a dose. For young children, the juice of half-a-leaf and of four leaves of *Agasta* (*sesbania grandiflora*) may be mixed with two grains of black pepper and 2 grains of dried borax and given in honey (Dymock).

The leaves are slightly bitter and astringent, and might be used as a tonic and stomachic. (S. Arjun).

The Santals give a preparation of the plant in certain menstrual complaints (Revd. A. Campbell).

735. *J. angustifolium*, Vahl., H.F.B.I., III. 598, Roxb. 32.

Sans.:—Kānana mallikā; asphota; vana malli.

Vern.:—Mwari; ban-mallikā (H.); chattu mallikā; caat-mallicā (Tam.); Chiri-malle; adevie-mallie (Tel.); Katu-pitsjegam (Mal.).

Habitat:—Dekkan Peninsula. Ceylon, in the lower Hills frequent; common, especially in the dry regions.

A scandent shrub, stems glabrous; twigs minutely pubescent or almost villous. Leaves very variable on the same plant, simple, numerous, small, usually $\frac{1}{2}$ -2 in., but at times attaining $3\frac{1}{2}$ in. Ovate-oval or oval-lanceolate, rounded at base, sometimes alternate, acute or obtuse at apex, glabrous. Flowers variable in size, white, on long slender peduncles, solitary or more usually in threes, at ends of short lateral divaricate twigs; Calyx glabrous; segments distant, short, $\frac{1}{8}$ - $\frac{1}{6}$ in., filiform, acute; Corolla-tube about $\frac{7}{8}$ in.; lobes 7 or 8, equalling the tube, linear oblong, very acute, ripe carpel. about $\frac{1}{8}$ in. by $\frac{1}{4}$ in. broadly-ovoid, unsymmetrical, both usually developed.

Use:—The bitter root, ground small and mixed with powdered *vassumboo* (root of *Acorus Calaums*) and lime-juice, is considered a valuable external application in cases of ring-worm (Ainslie).

736. *J. humile*, Linn., H.F.B.I., III. 602.

Syn.:—*J. chrysanthemum*, Roxb. 33; *J. revolutum*, Sims.

Sans.:—Hemapushpikā.

Vern.:—Chamba, juari, tsonu, tsuman, summan, kuja (Pb.); Sonajahi (Kumaun); Swarna-jui (B.); Malto, Pitmālti (H.); Pachcha adavi molla (Tel.).

Habitat:—Hills of India; Himalaya, from Kashmir to Bhutan; Abu. Hills of South India, common in the Nilgiris. Hills of Ceylon.

A small, erect, rigid, wholly glabrous shrub. Bark thin, grey. Wood white, moderately hard-grained. Branches angular, green, glabrous. A handsome shrub, with fragrant yellow flowers. Leaves alternate imparipinnate, rachis 1-1 $\frac{1}{2}$ in.; leaflets 5 (2 pair and an end one) (Trimen and Kanjilal), 2-3 by $\frac{7}{16}$ -1 $\frac{1}{8}$ in., variable in size, lanceolate-oval, oblong or ovate, very variable, glabrous. Flowers dimorphic, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, 1-3 together, terminal or leaf-opposed, in short terminal, compound, corymbose cymes. Pedicels $\frac{3}{4}$ in., drooping, thickened below flower. Calyx glabrous, segments short, triangular, acute. Corolla about lin., tube funnel-shaped, lobes 5, short, recurved, rotundate. Fruit didymous. Ripe berries globose or ellipsoid, pulpy, $\frac{7}{8}$ in.

Uses.:—The root is useful in ringworm (Honigberger). The milky juice, which exudes on an incision in the bark of this plant, is alleged to have the power of destroying the unhealthy lining walls of chronic sinuses and fistulas (Surg-Major B. Gupta, in Watt's Dictionary).

737. *J. officinale*, Linn., H.F.B.I., III. 603.

Vern.:—Chamba, Chirichog, Kiri (Kashmir); Bansu, Kwer, Dumni (Chenab); Dassi, Sanosem (Ravi); Suni, Somun (Sutlej); Chambeli (Kumaun).

Habitat:—The Salt Range and Himalaya, from the Indus to the Sarda.

A large, twining shrub. Youngest shoots slightly pubescent. Branches long, weak, dark-green, slightly ribbed. Leaves opposite imparipinnate; rachis channelled. Leaflets 2-3 pair, the terminal largest, lanceolate or rhomboid oblong, acute 2-3 in. long; the upper pair generally confluent with the terminal leaflet. Petiole marginate. Flowers white, with faint pink streaks outside, delightfully fragrant, in lax terminal cymes, rarely solitary and axillary. Pedicels slender, $\frac{1}{2}$ -1 in. long. Calyx-teeth linear, half, $\frac{2}{3}$ the length of the Corolla-tube. Corolla-tube about 1 in. Lobes usually 5, acute, about $\frac{1}{2}$ in. long, elliptic. Berries of 2 carpels ellipsoid, $\frac{1}{2}$ in. long.

Use:—The root has been found useful in ringworm (Honigberger).

738. *J. grandiflorum*, Linn. H.F.B.I., III. 603; Roxb. 34.

Sans.:—Jāti.

Vern.:—Chambeli (H. and Bomb.); Jāti (B.); Jaji (Tel.); Ghambeli (Guz.); Jāhi (U. P.).

Habitat:—Sub-Himalayan tract, from the Chenab westward, Oudh, Central India, Jumna to Godavery, Saharanpur, Siwalik, Dun.

A large, glabrous shrub, erect while young, say Kanjilal and Brandis, usually climbing or scrambling when older. Branches ribbed. Leaves opposite 3-4 in., imparipinnate. Leaflets 3-7,

says Kanjilal, sessile, the upper pairs generally confluent with the terminal leaflet. Petiole marginate; "the leaflets," says Collett, "are 7-11, ovate, end one $\frac{1}{2}$ -lin., often partially united with the uppermost pair." Flowers white, numerous, crowded, delightfully fragrant, with faint pinkish streaks outside (Kanjilal), often tinged with purple outside (Collett and Brandis); in lax terminal cymes, rarely solitary or axillary; pedicels $\frac{1}{3}$ -lin. long. "Calyx-teeth linear, less than half the length of the Corolla-tube; Corolla $\frac{1}{2}$ in.; lobes $\frac{1}{2}$ in. long," (Collett). "Calyx-tube linear, half to two-thirds the length of the Corolla-tube about $\frac{1}{2}$ in., lobes usually 5, about $\frac{1}{2}$ in. long, elliptic" (Kanjilal.) "Calyx-teeth twice the length of tube. Corolla tube $\frac{1}{2}$ in. long (Brandis). C. B. Clarke says:—"Calyx-teeth about $\frac{1}{2}$ in., rarely half as long as the Corolla-tube." Berries ellipsoid, $\frac{1}{3}$ in. long.

Uses:—Hindoo physicians prescribe the leaves as a remedy in skin diseases, ulcers of the mouth, otorrhœa, &c.

Mahomedan writers consider the plant to have deobstruent, anthelmintic, diuretic and emmenagogue properties. The author of the *Makhzan* mentions the use of the flowers applied in the form of plaster to the loins and pubes as an aphrodisiac (Dymock).

The scented oil is considered cooling.

The fresh juice of the leaves is applied to soft corns between the toes. In ulcerations or eruptions, in the mucous membrane of the mouth, the leaves are recommended to be chewed. An oil prepared with the juice of the leaves is poured into the ear in otorrhœa (Dutt).

In the United Provinces, the flowers and their essence are used as an application in skin diseases, headache, and weak eyes; the leaves are used in toothache (Atkinson).

739. *Nyctanthes arbor tristis*, Linn. H.F.B.I., III. 603; Roxb. 29.

Sans.:—Sephālikā; Pārijātak; Rājanikasa.

Vern.:—Harsingar; Saherwa; Seoli; Nibari (H.); Singhar; Harsingar; Sephalika, Shiuli (B.); Pakara; Laduri; Kuri (Pb.); Pārtak (Bomb.); Pagala-mully (Tam.); Munjapumerum (Mal.).

Habitat :—Cultivated throughout India.

A small, deciduous tree, 30ft., often forming coppice, scabrid pilose. Bark $\frac{1}{4}$ in. thick, light brown, rough. Wood pale-red, of pale yellowish brown, moderately hard, close-grained. A well-known tree, with fragrant flowers, which open at night and drop off in the early morning. Kanjilal says the bark is grey or greenish-white, rough. Branches quadrangular. Leaves opposite, $4\frac{1}{4}$ by $2\frac{1}{2}$ in. or 3in., ovate, acute, coriaceous, covered over with stiff white hairs on the upper surface; pubescent beneath, margin slightly recurved, entire or with distinct teeth, principal nerves conspicuous beneath. Base rounded or cuneate, petiole $\frac{1}{3}$ in., not articulated. Flowers sessile, 3-7 together in pedunculate heads, which are arranged in short trichotomous cymes; bracts elliptical. Calyx-tube $\frac{1}{2}$ in., campanulate, minutely 4-5-toothed. Corolla-tube $\frac{1}{4}$ - $\frac{1}{3}$ in. long, cylindric, orange-red. Limb white, spreading. Lobes 5-8, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, emarginate, contorted in bud. Anthers 2, subsessile, inserted near the mouth of the Corolla-tube. Ovary 2-celled; ovule 1 in each cell, erect. Capsule $\frac{1}{3}$ - $\frac{1}{2}$ in. long or $\frac{1}{4}$ in., $\frac{1}{8}$ - $\frac{1}{6}$ in. thick, orbicular, chastaceous, splitting into 2 one-seeded cells. Seeds exalbuminous, radical, inferior, cotyledons flat. Flowers throughout the year, in the Konkan during the rains.

Use :—The leaves, according to Sanskrit writers, are useful in fever and rheumatism. The fresh juice of the leaves is given with honey in chronic fever. A decoction of the leaves, prepared over a gentle fire, is recommended by several writers as a specific for obstinate sciatica (Dutt). According to the author of the *Makhzan*, six or seven of the young leaves are rubbed up with water and a little fresh ginger, and administered in obstinate fevers of the intermittent type, at the same time a purely vegetable diet is enforced. The powdered seeds are used to cure scurfy affections of the scalp (Dymock).

In the Concan, about 5 grains of the bark are eaten with betelnut and leaf, to promote the expectoration of thick phlegm (Dymock).

It is antibilious and expectorant, and useful in bilious fevers. (K. L. Dey).

The expressed juice of the leaves acts as a cholagogue, laxative and mild bitter tonic (Dr. Thornton, in Watt's Dictionary).

The expressed juice of the leaves is given with a little sugar to children as a remedy for intestinal (thread and round) worms. In several cases, it has been found to act efficaciously by destroying the worms. It may be tried as a substitute for *Santonin* (B. D. B.).

740. *Fraxinus floribunda*, Wall. H.F.B.I., III. 605; Roxb. 50.

Vern.: —Banarish (Afg.); Súm; Sunnu; Shun (Pb.); Angan, angu, dakhuri (U. P.); Kangu, tuhasi (Nepal).

Habitat: —Temperate and Sub-alpine Himalaya, from Kashmir to Bhotan and the Khasia Mts.

A large, deciduous tree. Bark ashy-grey. Smooth on young poles, dark and deeply longitudinally furrowed on mature trees. Wood white, with a light red tinge, no heart-wood, soft and moderately hard. Leaves opposite, imparipinnate, rachis 5-8 in. long. Leaflets usually 7, less frequently 5-9, lateral opposite 3-5 in. by 1-3 in., ovate, oblong, elliptic or lanceolate, usually long acuminate, falcately serrate, membranous, glabrous above, pilose on the nerves beneath when young. Main lateral nerves about 12 pair, slender, joined by reticulated secondary nerves. Petiolules $\frac{1}{2}$ - $\frac{1}{2}$ in. Inflorescence a large terminal panicle; pedicels fasciculated on the branches of the panicles. Flowers about $\frac{1}{2}$ in. long, generally 2-sexual. Calyx minute, acutely 4-toothed, somewhat enlarged in fruit. Corolla-lobes $\frac{3}{4}$ in. long, linear-oblong, narrowed at both ends, induplicate-valvate in bud. Stamens near base of Corolla-tube. Filaments about $\frac{1}{10}$ in. long. Ovary 2-celled. Stigma 2-fid; ovules 2 in each cell, pendulous. Fruit an oblanceolate samara, 1-1 $\frac{1}{2}$ in. including the wing. Seed solitary.

Use: —A concrete, saccharine exudation (manna) is obtained by incision from the stem, and is a substitute for the officinal manna. This is used for its sweetening and slightly laxative properties (Watt).

741. *F. excelsior*, Linn. H.F.B.I., III. 606.

Vern.:—Súm; Kúm (Pb.).

Habitat:—Temperate West Himalaya and Western Tibet, Kashmir hills.

A large tree, thick grey bark. Wood white, moderately hard. Leaves opposite, unequally pinnate. Leaflets 2-5 pair, all sessile or nearly so; 4 by $1\frac{3}{4}$ in., elliptic, acuminate, serrate, midrib beneath glabrous or minutely pubescent. Flowers in short racemes, fascicled near tips of the branches, appearing before the leaves. Male and hermaphrodite alike without perianth. Calyx in all flowers obsolete. Filaments very short. Racemes in fruit 1-6 in., pendulous, pedicels $\frac{1}{4}$ in. Samaras $1\frac{2}{3}$ by $\frac{1}{4}$ - $\frac{1}{2}$ in., narrowed gradually to both the obtuse ends.

Uses:—A small quantity of saccharine matter exudes on incision from its bark. This only constitutes, however, a very small part of the Manna of European commerce, and does not appear to be used in India at all.

The bark is bitter and astringent, and was at one time, though very undeservedly, called European cinchona.

The leaves are purgative (Watt).

Transverse incision from the stems of this and other species of *Fraxinus*, yields a concrete saccharine exudation, called Manna. Manna is a mild laxative, useful for children and delicate females, given in hot milk or in combination with other purgatives.

742. *Olea cuspidata*, Wall. H.F.B.I., III. 611.

Vern.:—Khwan; Shwan (Trans-Indus); Zaitún (Afg.); Ko Kohu; Káo; Kan (Pb.); Kan (H.); Khan (Sind.); Khwan; Shwan (Baluch.).

Habitat:—Fairly common, N.-W. Himalaya. Dehra, Jaunsur, Cabul, Baluchistan, south Suleman Range.

A moderate-sized, deciduous tree, 30 ft., glabrous, not spinous. Bark grey, thin, smooth, when young, when old exfoliating in long narrow strips. Wood very hard, smooth, close and even-grained; sapwood whitish; heartwood large, regularly shaped, from light-

brown or olive-brown to nearly black, clouded. Leaves 2-4 in. long, oblong, lanceolate, cuspidate, entire, very coriaceous, dark-green and shining above, thickly coated with a dense film of minute red scales; margins slightly recurved, midrib prominent, petiole about $\frac{1}{2}$ in. Flowers bisexual, whitish, in axillary trichotomous cymes, 1-2 in. long. Calyx nearly truncate or with 4 short teeth. Corolla deeply divided. Lobes $\frac{1}{10}$ in. elliptic, obtuse or acute, with a ridge along the middle, induplicate-valvate in bud. Anthers oval, dehiscing alternately. Style short, stigma bifid. Drupe $\frac{1}{2}$ - $\frac{1}{3}$ in. long, ovoid, black when ripe, supported by the remains of the Calyx. Endocarp bony; pulp scanty, oily.

Uses:—An oil is extracted from the fruit which is used medicinally as a rubefacient. Leaves and bark are bitter and astringent, used as an antiperiodic in fever and debility, (Brandis).

The Commissioner of Kohat has sent to the Indian Museum samples of the oil and fruit which is said to ripen in October and November. The fruits contained very little pulp and the oil appeared to be yielded by the seeds, the kernels of which contained 31.8 per cent. This may explain the small yield of oil recorded in pressing experiments made since 1851. It has been suggested that by grafting the European species and by improved method of extraction the yield might be improved. The oil of this wild olive has a greenish-yellow colour, and its characters resemble those of European olive oil. Crosley and Le Sueur in 1897 obtained the following constants: Specific gravity, 0.920; acid value, 5.0; saponification value, 190.9; iodine value, 93.6; Reichert-Meissl value, 6; insoluble fatty acids, 95.14 per cent. Like olive oil it was non-siccative, but the iodine value of this sample was abnormally high. A recent sample of this oil from Kohat had a more normal iodine value of 86.1 (Hooper).

743. *O. glandulifera*, Wall. H.F.B.I., III. 612.

Vern.:—Gúlili, raban, sira, phalsh (Pb.); Gair, galdu, garúr (Kumaon).

Habitat:—Fairly common along the outer Himalaya tracts, N.-W. Himalaya, from Kashmir to Nepal. Mountains of South India.

A moderate-sized tree, 20-60 ft., glabrous or nearly so. Bark $\frac{1}{2}$ in. thick, grey, uneven, exfoliating in brittle scales. Branches lenticillate. Leaves rhomboid-lanceolate 4-2 in., entire, ovate-lanceolate, long acuminate entire, margins slightly undulate;

base cuneate. Main lateral nerves 9-12 pair, slender, with glands at their axils on either side of midrib. Petiole $\frac{1}{2}$ -lin. long. Flowers cream-coloured, in terminal or lateral compound trichotomous cymes. Calyx, four toothed. Corolla deeply divided; lobes $\frac{1}{6}$ - $\frac{1}{8}$ in. long, elliptic. Anthers large. Ovary glabrate. Drupe $\frac{1}{2}$ in. long, ovoid, somewhat oblique, acute at apex; endocarp bony.

Use:—The bark and leaves are astringent and used as an antiperiodic in fevers (Atkinson).

N. O. SALVADORACEÆ.

744. *Salvadora persica*, Linn. H.F.B.I., III. 619; Roxb. 130.

Vern.:—Arák (Arab.); Darakhte-misvak (Pers.); Kabbar, kharidjar, pilu (Sind.); Jhál (Rajputana); Kaurivan, jhár (Pb.); Kharjál (H). Opa, ughai, kár kol, kalarva (Tam.); Waraguwengi; Ghoonia (Tel.); Pilu (Mar.); Khikan (Bom.).

Habitat:—India in the drier climates from the Punjab and Sindh to Patna. The Circars, North Ceylon.

A small glabrous evergreen tree, with usually a short and crooked trunk. Branches many, drooping, terete, glabrous, whitish-yellow. Bark thin, wood white, soft. Leaves, ovate or oblong, obtuse, $1\frac{3}{4}$ by $\frac{1}{2}$ in.; somewhat fleshy. Petiole $\frac{1}{2}$ in. Panixillary or terminal, compound, 2-5 in., numerous in the upper axils. Flowers greenish white, scattered, pedicelled. Calyx $\frac{1}{10}$ in. lobes ovate. Corolla $\frac{1}{10}$ almost 5-partite. Filaments short, anthers ovate. Drupe or Berry red, smooth, $\frac{1}{2}$ in. diam., scattered; tastes of mustard. Flowers all the year.

Parts used:—The fruit; bark; shoots; leaves; juice, and roots.

Uses:—In Persian works on medicine, the fruit is described as deobstruent, carminative, and diuretic. (Dymock.) It is said to be administered in Sind with good effect in cases of snakebite, and to be used both in the fresh and in the dried state, although in the latter it loses much of its efficacy, and has to be administered in considerably larger doses and combined with borax.

(Dr. Milach.) The fruit is also held to be purgative. Ainslie states that the bark of the stem is a little warm and somewhat acrid, and is recommended by Native physicians to be used as a decoction in low fever, and as a stimulant and tonic in amenorrhœa. The dose of the decoction is half a teacupful twice daily. (Materia Medica.) The shoots and leaves are pungent, and are considered by the Natives of the Punjab as an antidote to poisons of all sorts. (Murray.) The juice of the leaves is given in scurvy. The leaves are used by the country-people in the south of Bombay as an external application in rheumatism; they are heated and tied up in thin cotton cloth. (Dymock.) The bruised bark of the roots is acrid, and acts as a vesicant. (Ainslie.) It is "remarkably acrid; bruised and applied to the skin, soon raises blisters, for which purpose the Natives often use it. As a stimulant, it promises to be a medicine possessed of every considerable powers." (Roxburgh.)

The tree derives its Persian name (darakht-i-miswák, or tooth-brush tree) from the fact that the wood is much employed for the manufacture of tooth-brushes, and it is supposed by the Natives that tooth-brushes made of it strengthen the gums, keep them from becoming spongy, and improve digestion. (Stewart and Murray.)

745. *S. Oleoides*, Dene. H.F.B.I., III. 620.

Vern.:—Jhal (H.); Kabbar; Jhár; Mithi-diár (Sind); Jál, rán (Pb.); Khikan (Bomb.); Khikhanela, pilu (Mar.); Ughai; Koku (Tam.)

Habitat:—Punjab, Central and Northern and Sindh in the plains; Merwara, Trans-Indus.

A large evergreen tree or shrub. Bark $\frac{1}{2}$ in. thick whitish grey, tessellated. Wood light red moderately hard with a small irregular purple heartwood. Branches many, spreading, whitish. Leaves dull grey, linear or narrowly lanceolate, acute, 2 by $\frac{1}{2}$ in.; petiole $\frac{1}{2}$ in. Panicles mostly reduced to axillary fascicles of short spikes 1-1 $\frac{1}{2}$ in. Rachises after flowers have dropped rough from the crowded scars. Flowers greenish-white, sessile. Calyx about 1 $\frac{1}{2}$ in. long, divided about $\frac{1}{2}$ way down into 4 rounded lobes.

Corolla as long as or a little longer than the Calyx, lobes obovate-oblong, reflexed. Stamens exserted. Drupe—yellow when ripe reddish brown when dry, clustered, $\frac{1}{2}$ in., often touching each other.

Uses:—The oil obtained from the seeds by expression, is used as a stimulating application in painful rheumatic affections and after child-birth. The root-bark is used as a vesicant. (Dymock.)

The leaves *Rasuna* resemble the lanceolate senna, and are purgative. (Honnigberger.)

The fruit is sweet in taste, and is supposed by the natives of the Punjab to have aphrodisiac properties. The fruits eaten singly are said to cause tingling and small ulcers of the mouth, hence people prefer to eat them by handfuls, seeds and all, and the latter are apt to accumulate in masses in the sigmoid flexure of the intestines and lead to disagreeable results. (Stewart.)

The leaves are made into a decoction and given as a purgative to horses. (Watt.)

The seeds yield 44·6 per cent. of a hard, bright, yellow fat, having a faint slightly unpleasant odour and the following characters: sp. gr. at 99°–150°c., 0·867; acid value, 9·3; saponif value 254·2; iodine value, 5·9; solidif pt. of fatty acids (titer test), 304°c. (approx); m. pt. 38°c. The fat could be used in the manufacture of candles, and if freed from its unpleasant odour and taste might be of use in the preparation of vegetable butter and "chocolate fats." —J. Ch. I, May 15, 1913, p. 496.

The following chemical and physical constants were obtained with the commercial fat: Specific gravity at 50°, 0·9084; melting point, 41°; acid value, 11·26; saponification value, 242·36; iodine value, 7·48; Reichert-Meissl value, 1·28. Fatty acids: per cent. 94·12; melting point, 46°; iodine value, 8·3; neutralisation value, 244·42.

The oil of *S. persica* has similar properties. The oil-cake contains nitrogen 4·8, potash 2·8, and phosphoric anhydride 1·05 per cent. (Hooper).

746. *Azima tetracantha*, Lamk. H.F.B.I., III. 620.

Syn.:—*Monetia barlerioides*, L'Herit. Roxb. 716.

Sans.:—Kundali.

Vern.:—Kántagúr-kamai (Hind.); Tri-kanta-gati (Beng.); Sukkápát (Dec.); Sung-elley (Tam.); Tella-upi (Tel.); Sung-elley or sung-ilai, changan-chedi, muttu-chengan-chedi, nallo-changan-chedi (Tam.); Uppiaku (Tel.).

Habitat :—Deccan Peninsula ; “ one of the commonest shrubs of Coromandel, growing in all situations.” (Roxburgh.)

A straggling thorny shrub. Branches green herbaceous. Bark light brown, rough, wood white, soft, consisting of concentred layers in which the pores, surrounded by white loose tissue, are alternately scanty and many—(Gamble) young shoots pubescent, glabrous afterwards ; spines in each axil 1-2 in. number, $\frac{1}{2}$ -1 in. long. Leaves stiff, shining, sharply mucronate or spinescent $\frac{1}{2}$ -2 in. long $5\frac{3}{4}$ in. broad, elliptic, acute. Flowers greenish white, sessile, axillary, clustered, scarcely $\frac{1}{2}$ in. diam. Female flowers solitary or in 2-fid clustered. Male flowers in dense globose fascicles, the supporting leaves of the upper fascicles reduced to bracts or obsolete, so that the flower-branches end in naked interrupted spikes on which the flowers are whorled. Calyx $\frac{1}{10}$ in.; petals linear-lanceolate, acute, spreading, $\frac{1}{2}$ in. Ovary 2-celled. Cells 2-ovulate, or more often-1-ovulate. Berry $\frac{1}{2}$ in. diam. white ; usually 1 seeded.

Uses :—The leaves, root, and milky juice are bitter and are used medicinally by the Hindus. Dr. P. S. Mootooswamy, (Ind. Med. Gazette, October 1889), states that the leaves are considered stimulant, and are given to puerperal women immediately after confinement. They are administered in the following manner by the villagers :—The leaves with an equal quantity of Neem leaves, and a little powdered brick, are finely ground and given twice a day for the first two days, no food being allowed. For the next six days the woman gets a little boiled rice and pepper water once a day, and is allowed to drink a little warm water after the meal ; she is not allowed to sleep after her food during the day, and if thirsty must quench her thirst by eating betel leaves and areca nut. From the seventh day she gets her ordinary food. It is also the practice among the rural classes to give 2 or 4 ounces of Neem oil soon after delivery ; with a little roasted assafoetida, and the woman is made to take daily for a month from the morning of the third or fourth day a bolus of a stimulating confection, called *Nadaycayam* in Tamil, which is supposed to keep off cold from the system. (This practice is general amongst the country people in most part of India).

The leaves are also administered with food as a remedy for rheumatism, and their juice to relieve cough.

The root is considered to have the same properties as the leaves, and to be also diuretic; it is given in dropsy along with other drugs. Dr. Mootooswamy gives the following formula as much used by native doctors:—Take of the root bark 3x, *Tribulus terrestris* fruits, root of *Trianthema monogyna* and *Cephalandra indica* ʒiʒ. Beleric and chebulic myrobalans ʒss. Iron dross 3x. Goat's urine ʒviii, water four seers, Make a decoction and keep it for several days in the oven. Dose 2 to 3 ounces twice a day in as much water.

A decoction of the root leaves and bark with an equal quantity of *Acorus calamus*, ajowan seeds and salt is recommended as a remedy for chronic diarrhæa and 1 to 1½ ounces of the juice obtained from the root bark, with three ounces of Goat's milk, twice a day as a diuretic in dropsy.

(Pharmacographia Indica, Vol. II. pp. 385 etseq.)

"A decoction of bark is given as an antiperiodic in ague with success. It is astringent and tonic. The leaves used for ulcers, and especially after small-pox." (Surgeon-Major Lionel Beech, Cocanada.)

"The root-bark is used in muscular rheumatism." (Moodeliar, Madras.)

N. O. APOCYNACEÆ.

747. *Carissa carandas*, Linn. H.F.B.I., III. 630; Roxb. 231.

Sans.:—Karamardaka.

Vern.:—Karaunda, garinga, karroná, timukhia, gotho (H.); Kurumia, karamchá, karenja, bainchi, tair (B.); Timukhia (N.-W. P.); Gotho (C. P.); Karinda, baranda, karwand (Bom.); Karavanda, boronda (Mar.); Karamarda, timbarran (Guz.); Kendakeri, kerendo kuli (Uriya); Kalaka, kalapa (Tam.); Kalivi kaya, waaka (Tel.); Karekai, heggarjige (Kan.).

Habitat:—Cultivated for its fruit throughout the drier sandy or rocky soils of India.

Parts used:—The fruit and root.

A large erect evergreen shrub or small tree. Bark yellowish brown, peeling off in square scales. Wood white; heartwood irregular greyish or orange yellow, streaked, hard, smooth, close-grained, (Gamble). Branches many dichotomous rigid, spreading; axils and nodes with 2 straight sharp simple or forked thorns sometimes 1-2 in. long. Leaves subsessile, $1\frac{1}{2}$ —3 by 1— $1\frac{1}{2}$ in., oblong-oval or oblong-lanceolate, rather thinly coriaceous, glabrous, base rounded or retuse, apex obtuse, rarely mucronate. Flowers fragrant white or pale rose-coloured in threes, shortly stalked in cluster at end of short axillary and terminal peduncles; bracts small, linear, pubescent. Calyx-segments subulate lanceolate, acute, puberulous and ciliate. Corolla-tube $\frac{3}{4}$ in., glabrous or puberulous with swollen throat and lobes pubescent; lobes lanceolate, acute, about half as long as the tube, spreading. Ovary glabrous, cells 4-ovuled. Fruit a drupe $\frac{1}{2}$ —1 in. long, boardly ovoid, bluntly pointed, shinking, blackish or reddish purple with pulp of the same colour or pinkish white, with white sticky juice on the epicarp. Seeds 2-4 seldom more.

Uses:—The unripe fruit is astringent, and the ripe fruit is cooling, acid and useful in bilious complaints. The root has the reputation of being a bitter stomachic. "Used in Concan, pounded with horse urine, lime-juice and camphor as a remedy for itch." (Dymock.)

In Cuttack the decoction of the leaves is very much used at the commencement of remittent fever. (Surg.-Major P. N. Mukerji.)

The fruit has been reported by several medical officers to possess antiscorbutic properties. (Watt, II. 165.)

"The roots were air-dried, reduced to powder, and digested with 80 per cent. alcohol. The alcohol-free extract was mixed with water, dilute Sulphuric acid added, and agitated with benzole, which separated an oil of the consistence of honey at 75° F., and partly soluble in absolute alcohol with acid reaction. A trace of volatile oil was also present, with an odour similar to that of Piper Betle leaf oil. During agitation with benzole a mass of dark-yellowish resin separated, which caked. The liquid containing the separated resin was next agitated with ether. The ether extract was not more than a trace, and contained Salicylic acid. The insoluble mass of resin was now separated, and

the aqueous solution rendered alkaline and agitated with ether. The ether extract contained an alkaloid which gave marked precipitates with the usual reagents. The dark brown yellowish resin, insoluble in ether and benzole, was wholly soluble in ammonia, and on spontaneous evaporation left a brittle residue. The ammoniacal solution when freshly made was yellow, but on standing became green, and on spontaneous evaporation the solid residue was brownish." (Pharmacographia Indica, Vol. II, p. 420.)

748. *Rauwolfia serpentina*, Benth. H.F.B.I., III. 632.

Syn. :—*Ophioxylon serpentinum*, Linn., Roxb. 233.

Sans. :—Sarpagandhá ; Chundrika.

Vern. :—Chota-chánd (H.) ; Chandra ; Chota-chánd (B.) ; Chandra, chota-chand, karavi, harkai, (Bomb.) ; Harkaya (Mar.) ; Pátala gandhi, pátala garuda (Tel.) ; Chuvanna-avilpori (Malay.).

Habitat :—Tropical Himalaya and plains near the foot of the hills, from Sirhind and Moradabad to Sikkim. The Khasia Mountain and in the Deccan Peninsula along the Ghats to Travancore.

A small, erect, glabrous shrub, 6-18 in., rarely 2-3 ft., in a rich soil, climbing (Roxb). Bark white, rarely lenticilate. Leaves 3-7 by $1\frac{1}{2}$ - $2\frac{1}{2}$ in., very pale beneath, elliptic lanceolate, or obovate, acute or acuminate, nerves 8-12 pair, petiole $\frac{1}{2}$ in. long, penduncle 2-5 in., stout, branches and pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in. Flowers white or pinkish, nearly 1 in. long, arranged in terminal or lateral corymbose cymes. Calyx small, bright red ; bracts minute, lanceolate. Calyxlobes $\frac{1}{2}$ in. long, lanceolate. Corolla about $\frac{1}{2}$ in. long ; tube slender, shortly globosely inflated above the middle, often curved, margins of lobes of Calyx undulate. Disk membranous ; lobed. Drupes in pair or single, black, $\frac{1}{4}$ in. diam, broadly obliquely ovoid ; endocarp slightly rugose.

Parts used :—The root, leaves and juice.

Uses :—It is held in high esteem by the natives as an *antidote to sanke-bites*, but reliable evidence of its utility is wanting. It is also valued as a *tonic and febrifuge*. Horsefield (Asiat. Journ., vol. viii., p. 148) states that the root yields a strong

bitter infusion, and that its sensible properties indicate considerable activity. According to the same authority, it is employed by the Javanese as an anthelmintic. Dr. Pulney Andy reports that a decoction of the root is employed in labours to increase uterine contractions (Ph. Ind.). "But we have no evidence of its efficacy in such cases." (Dymock).

According to Rumphius, the juice of the leaves is instilled into the eyes by the natives of India and Java, as a remedy for the removal of opacities of the cornea.

In Bombay, most of the labourers who come from the Southern Concan keep a small supply of the root, which they value as a remedy in painful affections of the bowels. In the Concan, the root with *Aristolochia indica* is given in cholera, in colic, 1 part of the root with 2 parts of *Holarrhena* root and 3 parts of *Jatropha curcas* root is given in milk. In fever the root with *Andrographis*, ginger and black salt is used. The dose of the combined drugs in each case is from 3 to four tolás (Dymock).

The authors of the *Pharmacographia India* write:—

The roots examined by us reduced to fine powder lost 7.18 per cent., when dried at 100° C. The ash amounted to 7.89 per cent, and was of a light chocolate colour containing a marked amount of iron and a trace of manganese. On analysis the following results were obtained.

Petroleum ether extract	...	...	64 per cent.
Ether	"	...	346 "
Alcoholic	"	...	8.936 "
Aqueous	"	...	11.88 "

The petroleum ether extract was oily, yellow, and possessed an odour like that of a mixture of cedar and musk. On standing arborescent crystals separated; in alcohol the extract was partly soluble with acid reaction the insoluble residue was oily and contained a trace of a wax. The extract afforded marked indication of the presence of an alkaloidal principle.

The ether extract was hard and had the same odour as the petroleum ether extract, but in a less marked degree. Treated with water a slightly bitter solution was obtained, which gave no reaction with ferric salts; by the action of dilute sulphuric acid an intensely bitter solution was obtained which contained an alkaloid. A yellow resin was also present.

The alcoholic extract was brittle, yellowish brown and intensely bitter. A solution in alcohol exhibited a very marked greenish fluorescence. In cold water the extract was partly soluble with slight fluorescence, and very bitter: ferric salts gave no colour reaction. The alcoholic extract was treated with dilute sulphuric acid and the turbid acid solution agitated with chloroform

after separation of the chloroform, the liquid was rendered alkaline with ammonia, and agitated first with chloroform, ether, and finally with amyllic alcohol. The three extracts exhibited fluorescence when dissolved in alcohol, but the appearance was most marked in that obtained by chloroform acting on the acid solution. The chloroform extract deposited a yellowish granular mass on standing, which was non-crystalline; in taste the extract was extremely bitter: it afforded marked indication of the presence of an alkaloid, but was not wholly soluble in diluted Sulphuric acid. The ether-chloroform extract was non-crystalline, it was also bitter, but the bitter taste was associated with some astringency; it was wholly soluble in dilute sulphuric acid, and afforded marked indications of the presence of an alkaloid.

The amyllic alcohol extract was of a dark colour, and wholly soluble in dilute sulphuric acid and very bitter: it also gave marked alkaloidal reactions. With sulphuric acid, none of the extracts afforded crystalline salts.

The aqueous extract had a bitter taste; it reduced an alkaline copper solution on boiling: with ferrocyanide of potassium and acetic acid a faint turbidity was produced. The residue insoluble in water contained a large amount of starch.

At present we do not offer any opinion as to whether the alkaloidal principles we have referred to in the various extracts are identical or not. We are also at present unable to state whether these alkaloids are new or merely principles which have already been described as occurring in other plants of the same natural order. An analysis of the root of ophioxylan *Serpentinum* by W. Bettink has been published in Haaxman's *Tijdschrift*, (Jan. 1888), where no alkaloid is reported to have been found, but a crystalline body related to juglone. We feel convinced that the drug examined by Bettink was not authenticated. Prof. Eykman has recorded the discovery of an alkaloid in an Indian species of *Ophioxylon* and later, still (1890), M. Geishoff has found an alkaloid giving a veratrine reaction with Frohde's reagent, thus substantiating our analysis. It is probable that as the root resembles *Plumbago* root, Prof. Bettink's ophioxylin was only plumbagin.

[Pharmacographia Indica, Vol. II, p. 415—417.]

749. *Cerbera odollam*, Gærtn. H.F.B.I., III. 638;
Roxb. 232.

Vern.:—Dabur; Dhakur (B.); Sukanu (M.); Kada mal; Katarali; Kadaralai; Kadu (Tam.); Odallam (Mal.).

Habitat:—Salt swamps, or on the Coast of India, common in the South Concan.

A moderate-sized, evergreen tree or large shrub, wholly glabrous. Wood grey, very soft, spongy. Branchlets whorled, very stout, marked with leaf-scars, twigs thick, shining. Leaves large, alternate, rather closely placed at end of year's growth, 5-12in.,

linear-lanceolate or slightly obovate, much tapering to base—rather suddenly acuminate, subacute, glabrous, pale beneath, rather thick, venation pellucid, lateral veins numerous, horizontal, connected by an intermarginal one. Petiole 1-1½ in. long. Flowers large, on a stout erect peduncle, white, with throat yellow, sweet scented, in ample terminal cymes or flat topped panicles; bracts ½-1 in. long, oblong, acute deciduous. Calyx segments ¾-1 in. linear-oblong, acute, recurved, glabrous, deciduous. Corolla-tube ¾ in., lower third narrow, upper part dilated, throat nearly closed by 5 pubescent projecting wings; lobes 1 in. Ovule, obtuse, oblique; filaments very short (Trimen). Ovary of 2 distinct carpels united by a single style. Fruit (from the abortion of one carpel) a drupe, 2-4 in. long, flattened on one side, with a fibrous endocarp. Seed usually one, oily, albumen 0 (Brandis).

Uses.:—The whole plant is full of an acid milky juice. Emetic and purgative properties are assigned to the milky sap and to the leaves, but their use is to be condemned (Ph. Ind.).

The nut is narcotic and poisonous. The green fruit is employed to kill dogs (Balfour).

The fruit combined with *Datura* is a part of remedy given by native physicians for hydrophobia (Pharmacographic Indica, Vol. II, p. 410).

The bark is purgative (Watt).

The kernel of the fruit is an irritant poison, producing, when taken internally, vomiting and purging, soon followed by collapse and death (Surgeon-Major Houston, in Watt's Dictionary.)

Cerebrin $C_{27}H_{46}O_8$ occurs in the seeds. It forms colourless, odourless crystals, with a bitter taste, turns yellow at 180–185°, and melts at 191–192° (corr.). It disparts of the solvent at 16-21°.—Chloroform 8.83; alcohol 90 per cent. 12.43, absolute, 12.89, 75 per cent. 27.27; isobutyl alcohol, 14.7; amyl alcohol, 14.87; ether 178.5, benzene, 544.7; carbon tetrachloride, 813; water, 5555 (at 100°, 4974); carbon bisulphide, 12, 487; light petroleum (sp. gr. 0.675), 36, 730. It has the following values of specific rotation: $[\alpha]_D$ in 90 per cent. alcohol—74.61°; in ether—64.76°; in chloroform, 74.82°; in acetic acid—80.81°. Analysis and molecular weight determinations lead to the formula $C_{27}H_{46}O_8$; but its properties show that it is not identical either with the taughinin of Arnaud or with the thevetin of De Vrij. It exhibits the following colour reactions: I. Yellow coloration, when warmed with dilute sulphuric, hydrochloric, or nitric acid.

II. Polychroic solution (orange-yellow-violet-blue) in concentrated sulphuric acid. III. A quickening, emphasising, and sometimes a characteristic modifying, of colour reaction II, when to the sulphuric acid are added small quantities of (a) phenols (thymol, α -naphthol, cresol, or glycocholic acid), or (b) aldehydes (furfuraldehyde, cane-sugar, vanillin, heliotropin, &c.). Reaction III (a) seems to indicate that cerebrin is a glucoside, III. (b) that it is a phenol. As a matter of fact, cerebrin is hydrolysed when heated with alcoholic sulphuric acid for two hours, and yields a small quantity of sugar, probably glucose, and 62 per cent. of cerberetin $C_{19}H_{26}O_4$ (?), a lemon-yellow, amorphous powder, which melts at 85.5° (corr.), is optically inactive, and is precipitated from its solution in alcohol by the addition of water; the alcoholic solution has, even when diluted to 1 : 5000, a perceptible yellow color. Like cerebrin, it is a poison. Observations of the physiological action of cerberin agree with those of Zotos (Dissertation Dorpat, 1892); it has the advantages, without the disadvantages, of digitalin. J. Ch. S. 1893 A.I. p. 487.

The seeds are very poisonous, and were found by Plugge in 1893 to contain cerberin, a heart poison. The seeds yield 55 per cent. of a bland fixed oil, of a pale yellow colour, which is used for burning and for anointing the head. The specific gravity at 15.5° is 0.919; it affords 95.5 per cent. of fatty acids, melting at 34° . (Hooper.)

750. *Rhazya stricta*, Decaisne, H.F.B.I., III. 640.

Vern.:—Sunwar (H.); Wena; Gandera (Pb.); Sehar, Seewur (Sind.); Wargalion; Vargalum (Pushtu); Ishawarg (Mushree).

Habitat:—Sind, Salt-range and Peshawar.

A small, glabrous, very stout, erect, sparingly branched, leafy shrub, gregarious. Leaves alternate, lanceolate or oblanceolate acute, coriaceous, 2-4 in., by $\frac{1}{2}$ - $\frac{3}{4}$ in., yellowish when dry, sessile. Flowers in short, axillary, stoutly branched cymes, shortly and stoutly pedicelled; white; tube $\frac{1}{3}$ in., upper half inflated; lobes ovate, mucronate, short. Ovary of two distinct carpels. Style filiform, top broad, thickened; stigma sometimes furnished with a reflexed membrane. Ovules numerous, 2-seriate in each carpel. Fruit of 2 erect follicles, 2-3 by $\frac{1}{4}$ in., thinly coriaceous, slightly compressed; seeds numerous, flat, with short membranous wings at two ends, $\frac{1}{8}$ in. long. Embryo straight, in a fleshy albumen.

Uses:—The juice of the leaves is given with milk to children for eruptions, and an infusion of them is very useful for sorethroat, low fevers and general debility. The leaves, which are very bitter, are sold in the bazars in Sind, the natives using

them in the preparation of cooling bitter infusions. Dr. Stocks describes the infusion as a good and peculiar bitter tonic, and recommends it for trial (Ph. Ind., p. 139).

The fruits and leaves are considered efficacious in cases of boils and eruptions (Stewart).

In Afghanistan, the roots, stem, leaves and flowers, are dried and used in infusion for the treatment of syphilis, in all its stages, and of chronic rheumatism, old joint affections and pains of every kind (Duthie, in Watt's Dictionary).

The leaves are reputed to be a bitter tonic for fevers and general debility, and they have been reported as poisonous. The leaves contain a large quantity of alkaloids, one of which is volatile and has the odour of conine, the alkaloid of hemlock. The non-volatile alkaloid resembles in some particulars one of the bases of *Aspidiosperma*; it dissolves in sulphuric acid with a red colour, changing to purple, and contains 3.01 per cent of nitrogen.

751. *Vinca rosea*, Linn. H.F.B.I., III. 640.

Vern. :—Ainskati (Uriya); Rattan jot (Pb.); Sadapûl (Mar.); Billa-ganeru (Tel.).

Habitat :— A West Indian plant, much cultivated about pagodas, &c., in India.

Leaves obovate, flowers white, rosy or pink, axillary, 1½-2 in. diam., grown here in Andheri, and in my Thana and Ratnagri gardens, with four varieties :—(1) *vinca alba*, plain white, with a cream coloured throat; (2) *vinca alba*, with the throat green; (3) *vinca alba*, with throat deep crimson; (4) Pink throated or deep crimson throated *vinca rosea* (K. R. Kirtikar). This is what Asa Gray says :—Tropical, erect, somewhat woody, at base: flowers produced at all seasons. House and bedding plant from West Indies, with oblong-petioled veiny leaves, and showy Corolla, with slender tube and very narrow orifice, rose-purple or white, with or without a pink edge (Field, Forest and Garden Botany, New York, p. 275, 1868.)

Use :—The juice of the leaves is employed in Orissa as an

application to wasp stings (Surgeon-Major P. N. Mukerji, in Watt's Dictionary).

752. *V. pusilla* Murr. H.F.B.I., III. 640.

Syn. :—*V. parviflora*, Retz. Roxb. 242.

Sans. :—Sangkhi ; Sangkhapuli.

Vern. :—Kapa-vila (Malay.).

Habitat :—Western Himalaya ; Garhwal, and Upper Gange-tic Plain ; common throughout the Deccan.

An erect, pale-green, annual herb, 1-2ft. high, erect, glabrous, branched from the base. Stem and branches acutely 4-angled. Leaves $1\frac{1}{2}$ - $2\frac{1}{2}$ by $\frac{1}{2}$ - $\frac{3}{4}$ in., lanceolate, acuminate, membranous, margins minutely scabrid, stipular, glands subulate. Petiole $\frac{1}{4}$ in., or less, slender. Flowers very small, subsessile, $\frac{1}{2}$ in. long, on short pedicels, white. Sepals filiform. Corolla-mouth narrow, hairy, throat glabrous, thickened. Follicles 2-3in., very slender, diverging, straight membranous. Seeds $\frac{1}{10}$ in., linear-oblong, cylindric, rounded at both ends ; testa black, many-ribbed, ribs rough. Except for the Corolla this has all the appearance of a gentian.

Use :—A decoction of the dried plant, boiled in oil, is rubbed on the loins in cases of lumbago (Ainslie).

Dr. W. Burns, Economic Botanist, Agricultural College, Poona, has had cases of cattle-poisoning from this plant, reported to him. (K. R. K.).

753. *Plumeria acutifolia*, Poiret., H.F.B.I., III. 641.

Syn. :—*P. acuminata*, Roxb. 248.

Vern. :—Gulachin, goburchamp, golainchi, chameli (H.) ; Gorur champa (B.) ; Kát champa (Uriya) ; Gulanj baha (Santal.) ; Champa pungar (Gond.) ; Khair-champâ, dolochápâ, khad-champo, gulachin, chameli (Bomb.) ; Rhuruchápha ; Khair champâ (Mar.) ; Rhadachampo (Guz.) ; Váda ganneru (Tel.) ; Kanagala ; Ganagalu ; Go Sampige. (Kan.).

Habitat :—Cultivated and naturalised in many parts of India.

A small, deciduous tree, with crooked trunk and thick fleshy branches, full of tenacious milky juice. Bark, with a smooth peppery outer layer, grey, shining, exfoliating in small flakes. Wood yellowish-white, soft. Branches swollen and dichotomous. Leaves alternate, lanceolate or oblanceolate acute at both ends, spirally arranged at the ends of branches, 15 in., petiole 1-1½ in., 1-glandular at the top. Secondary nerves numerous, straight, transverse, joined by straight intramarginal veins. Flowers fragrant, large, white, slight crimson, streaked without, pale yellow within, near the centre, in compound pedunculate cymes, usually when the tree is leafless. Fruit very seldom seen in India, follicular. Seeds winged. Corolla deciduous, before the anthers are mature "and the ovary is mature enough to receive the pollen. I found a pair of follicles 9 in. long each, and about 1 in. broad, in Satara, on a tree, in March 1898, in one of the cantonment-gardens. I had the honour of presenting one of them to Emeritus Professor Woodrow of the College of Science, Poona. The follicle, figured in the Litho plate of this work, is from a drawing made for me by Mr. J. Berriman-Vears of Ratnagiri of the original follicle now in my possession. I have grown in pots in my garden a variety of this plant, with flowers deep crimson outside and orange, yellow within." (K. R. Kirtikar).

Parts used :—The bark, leaves, juice, branches and flower-buds.

Uses :—Mir Muhammad Hussain describes the tree under the name of A'Chin, and states that the root bark is a strong purgative, and also a useful remedy in gonorrhœa and for venereal sores. He recommends butter milk to be given in cases of excessive purgation after its use. Plasters made of the bark are said to be useful in dispersing hard tumors (*Pharmacographia Indica*, Vol. II, p. 421.)

Dr. Hove, in 1787, found the tree growing abundantly on Malabar Hill, and mentions that the inhabitants used it for intermittents, as we do cinchona. S. Arjun (*Bombay Drugs*) writes that the leaves, made into a poultice, are used to dispel swellings; the milky juice is

employed as a rubefacient in rheumatism, and the blunt-ended branches are introduced into the uterus to procure abortion. According to Dymock, the bark is given in the Konkan, with cocoanut, *ghi*, and rice, as a remedy for diarrhœa; the flower-buds are eaten with betel leaves in ague, and the juice, with sandalwood oil and camphor, is employed as a cure for itch.

"Sap mixed with cocoanut is used as a remedy for itch (Talbot)."

Campbell states that in Chutia Nagpur the leaves and root are used medicinally, but that the part best known to the forest tribes of Manbhum is the core of the young wood, which is given to lying-in women, to allay thirst, and for cough. In the *Baroda Durbar Catalogue of Medicinal Plants, at the Col. and Ind. Exhb.*, it is stated that the bark is purgative and used in cases of leprosy.

"This plant is known as *Dalána phula* in Northern Bengal, where its milky juice has been tried and found to be an effectual purgative. The dose is as much as a grain of parched rice (*khai*) will absorb, the grain being administered as a pill." (Surgeon-Major C. T. Peters, M.B., in Watt's Dictionary).

Dr. A. J. Amadeo (Pharm. Journ; April 21st, 1888,) has the following account of its medicinal uses in Porto Rico:—"In small doses (8 to 12 grains) given in emulsion, the milk produces abundant bilious watery stools. The bark is a favourite remedy with the country people for gonorrhœa and gleet. Two ounces of the fresh powdered bark is placed in 8 pints of *eau sucrée* and exposed to the sun for four days, being shaken occasionally. A wine glassful is administered four or five times a day, together with refreshing and mucilaginous drinks, and the use of tepid baths. The action of the drug is at first purgative, afterwards diuretic. An extract of the bark may be used beginning with 3-4 grains daily to be gradually increased to 14 or 15 grains, or a wine (1 oz. to 1 litre) may be given in liqueur glassfuls three times a day. The decoction of the bark is a powerful antiherpetic.

A crystalline, bitter principle $C_{57}H_{72}O_{33} + 2H_2O$, obtained by evaporation of the alcoholic extract, melts at 157-158° and forms a colourless solution in concentrated sulphuric acid, which, on warming, turns yellow, reddish-yellow, brownish-red, or black. Its solution in concentrated nitric acid is also colourless, but becomes yellow on warming, and, similarly, the solution in sodium hydroxide turns yellow on boiling. This substance cannot be identical with plumieride, which has been isolated by Boorsma.—J. Ch. S. A.I., 1897; p. 167.

The *plumeride*, isolated by Boorsma from the bark of *Plumeria acutifolia* appears to be identical with the substance obtained by Merck from the same source, although the former investigator stated that it did not melt, whereas the latter gave its melting point as 157-158°. A. P. N. Franchimont finds that the substance melting at 157° is the hydrated form of *plumieride*; when crystallised from dry ethylic acetate, it separates in the anhydrous condition, and then has no definite melting point. A molecular weight determination by the cryoscopic method gave numbers varying from 537 to 572; these values are approximately half those obtained by Merck, who used the ebullioscopic method. *Plumeride* is a glucoside, for, when boiled with 5 per cent. hydrochloric acid, it is hydrolysed, yielding glucose and an insoluble, amorphous, brown substance. An acid, named *plumieridic acid*, is produced by dissolving *plumieride* in aqueous potash and allowing the solution to remain for some time; the solution, when acidified with dilute sulphuric acid yields the new compound, which is sparingly soluble in water. This acid is slightly soluble in methylic alcohol and insoluble in ethylic alcohol, ether, chloroform, or benzene; it decomposes at temperatures above 200°; its dilute aqueous solution is laevorotatory. The potassium salt crystallises from water. *Plumieridic acid* is also a glucoside, for, on boiling with 5 per cent. hydrochloric acid, it behaves like *plumeride*, yielding glucose and an amorphous, brown substance. *Plumieride* seems also to be identical with *agoniadin*, obtained by Peckolt (*Arch Pharm* 1870, ii, 142, 40) from *P. lancifolia*, for the latter substance behaves similarly on hydrolysis, and melts at 155°.—J. Ch. S. 1899 A, I. 933.

754. *Alstonia scholaris*, Brown. H.F.B.I., III. 642.

Sans. :—Sapta-parṇa ; Viśāltvak ; Brihattvaka.

Vern. :—Chatwan, Chhatin, Chatian (B.) ; Satiūn, chatiūn, satwin, satni (H.) ; Chhatnia (Uriya) ; Chatin, bomudu (Kol.) ; Chatiwan (Nepal) ; Purbo (Lepcha) ; Satvin (Mar.) ; Ezhilaip-pāīi, wodrase (Tam.) ; Edakula-pāla, palagaruda, édā kula-ariti, édākula-pouna (Tel.) ; Janthalla, Mudhol, Kodale, Madale, Kadu-sale, hale. (Kan.).

Habitat :—Drier forests of India; in the tropical region of the Western Himalaya, from the Jumna eastwards to Assam, and southwards to Ceylon.

A large, evergreen tree, up to 60 feet or more in height, with bitter milky juice. Stem tall, base often tufted or buttressed. Branches spreading, in tiers of whorls. Bark dark-grey, somewhat rough, lenticilate. Wood white, soft, even-grained, seasonably hard and soon gets mouldy and discoloured, if allowed to season in log (Gamble). Leaves in whorls of 4-7; 4-8 by 1-1½ in.,

glabrous, coriaceous, shining above, dull and pale-green beneath, oblong or ovate-oblong, elliptic-oblong or oblanceolate, subsessile or narrowed into a short petiole, $\frac{1}{4}$ - $\frac{1}{2}$ in. long; lateral nerves numerous, straight, terminating in an intramarginal vein. Flowers greenish-white in compact umbellately corymbose pubescent, pedunculate cymes; the umbels whorled. Peduncle 1-2 in. long. Calyx small, $\frac{1}{10}$ - $\frac{1}{8}$ in. long, pubescent 5-lobed lobes $\frac{1}{2}$ in., oblong, ciliate. Corolla $\frac{1}{8}$ - $\frac{1}{2}$ in. diam., villous inside; tube $\frac{1}{8}$ - $\frac{1}{2}$ in. long; constricted in the middle, hairy on both sides; lobes rounded, spreading, twisted in bud. Stamens above the middle of the Corolla-tube, included, anthers acute. Ovary of two distinct carpels. Fruit of two long slender follicles, over a foot long, slender, flattened, peltately attached; densely ciliate, with long hairs all round (Kanjilal).

The tree has obtained the trivial name *scholaris* from the facts of its planks covered with a layer of sand being used as school-boards on which children trace their letters, as in the Lancastrian system. The natives have a superstitious fear of it, and say, it assembles all the trees of the forest once a year to pay homage. (Graham.)

Uses:—It is officinal in the Pharmacopœia of India. The bark of this is medicinally used as an astringent tonic, anthelmintic, alterative and antiperiodic. It is a valuable remedy in chronic diarrhœa and the advanced stages of dysentery. It is also useful in catarrhal fever. The milky juice is applied to ulcers, and, mixed with oil, in ear-ache. "The tender leaves, roasted and pulverised and made into poultices, act as a useful local stimulant to unhealthy ulcers with foul discharges" (Surg. Thompson, Madras).

"The bark of this tree contains a bitter principle, known as *dâtain*, which has been reported to be equal to quinine, while free from its secondary effects. Largely used in the hospitals of Manilla, but never been experimented within India."

In the Concan, the bark is given in leprosy, an extract being prepared from the fresh bark and given in milk; it is also prescribed in dyspepsia as an anthelmintic; and the juice of the leaves with that of fresh ginger root or zedoary is administered to women after confinement. (Pharmacographia Indica. Vol. II, p. 387.)

The following is from the second report of the Indigenous Drugs Committee (p. 19.) :—

Way to use it.—Administer in doses of 10–60 minims (of the tincture.)

- (i) in cases of fever as an antiperiodic.
- (ii) in convalescence after fever as a tonic.
- (iii) in cases of diarrhoea and dysentery.

Remarks.—The natives of India have considerable faith in *Alstonia* bark. They use it in fevers and in dysentery : they also use it in skin diseases, ulcers, etc., and for a number of other complaints. Possibly it may be found better as a tonic after quinine than in the place of quinine.

Dr. Dymock has found the tincture of the bark to act in certain cases as a very powerful galactagogue ; in one case, the use of the drug was purposely discontinued at intervals and on each occasion the flow of milk was found to fail (*Pharmacographia Indica*, Volume II, page 387).

The following statements are made in the report on the Continental Exhibition presented to the American Pharmaceutical Association (*Transactions*, 1877) about the use of this drug and its alkaloid, ditain, in Manilla :—
“Equal doses of ditain and of standard quinine sulphate have had the same medicinal effects ; besides having none of the disagreeable secondary symptoms such as deafness, sleeplessness and feverish excitement, which are the usual concomitants of large quinine doses, ditain attains its effects swiftly, surely and infallibly. * * * * *. The results arrived at by ditain in our Manilla Hospitals and private practice are simply marvellous. In our Military Hospital and penitentiary practice, ditain has perfectly superseded quinine.” (*Pharmacographia Indica*, Volume II, page 388.)

Experiments have already been made for the Indigenous Drugs Committee, but are not conclusive ; and more evidence must be collected. Captain Stewart, I.M.S., who used one drachm doses, reported that in mild cases of fever it was as effective as quinine. Drs. W. D. Innes and Ditta Mall Dhingra did not find it as good as quinine in fever cases. Major Hare and Dr. C. Bancroft found it serviceable in dysentery.

The first Report of Proceedings of the Central Indigenous Drugs Committee of India (published Calcutta 1901) contains records of results of observations by Medical Officers serving in different provinces of India. The consensus of their observations seems to show that the drug is useful in diarrhoea and dysentery, but that its effect as a febrifuge is not lasting. According to Lieut.-Colonel H. A. F. Nailer, Acting District Medical and Sanitary Officer of Tanjore, who used the drug in 14 cases of ague,

“In all of which it caused the temperature to fall steadily to normal in a short time : no perspiration was induced, but the urine was observed to be increased and high colored. In one case of pyrexia, 104°, it reduced the temperature to 96° in three days. The drug was then omitted, when the temperature rose to 104°. The drug was again administered, when temperature again fell to 96°. It was then stopped and Quinine in 5 gr. doses was

given, which checked the periodicity of the fever. Of the 14 cases of ague, 8 were in-patients, whose cases were carefully noted; 6 were out-patients. Of these, it is recorded that they did not come after the first day, perhaps because the fever had declined; 4 of the patients had enlarged spleen, but no effect in that organ was detected."

Dr. Chas. Bancroft, Civil Medical Officer, Garo Hills, who used the Tincture, reported it

"A valuable remedy in diarrhœa and dysentery: in the latter disease it proved very beneficial in advanced cases, and was found most efficient as a "stomachic" in restoring alimentary tone in convalescence and debility, following malarial fevers."

"In the form of a mixture only, combined with Tincture of Opium (m. x) in dysentery, and with the Infusion of Gentian in bowel complaints (diarrhœa), and with official bitters (chiretta), orange peel and Nux-Vomica, as an alterative and tonic.

Doses.—In dysentery ʒi doses with Tinct. of Opium, m. x made up with Peppermint water, thrice daily.

In diarrhœa ʒss dose with Spts. Chloroform and Infusion Gentian, every 4 hours.

As alterative tonic ʒi doses, combined with orange peel, Nux-Vomica and Aqua Chloroformi.

Chemical composition.—In 1875, Jobst and Hesse exhausted the powdered bark with petroleum ether, and then extracted, by boiling alcohol, the salt of an alkaloid, which they called *Ditamine*. After the evaporation of the alcohol, it is precipitated by carbonate of sodium and dissolved by ether, from which it is removed by shaking it with acetic acid. *Ditamine* as again isolated from the acetate forms an amorphous and somewhat crystalline, bitterish powder of decidedly alkaline character; the bark yields about 0.02 per cent. of it.

From the substances extracted by means of petroleum ether, as above stated, Jobst and Hesse further isolated (1) *Echicaoutchin*, $C^{21}H^{40}O^2$, an amorphous yellow mass; (2) *Echicerin*, $C^{46}H^{88}O^3$, forming acicular crystals, melting at $157^{\circ}C$.; (3) *Echitin*, $C^{52}H^{82}O^2$, crystallized scales, melting at 170° ; (4) *Echitein*, $C^{22}H^{40}O^2$, which forms rhombic prisms, melting at 195° .; (5) *Echiretin*, $C^{31}H^{44}O^2$, an amorphous substance, melting at $52^{\circ}C$.

Echicaoutchin may be written thus: $(C^3H^4)^4O^2$, *echicerin* $(C^3H^4)^{12}O^3$, *echiretin* $(C^3H^4)^4O^2$; these formulæ at once point out how nearly the three last named substances are allied. They are probably constituents of the milky juice of the tree. (*Pharmacographia*, 2nd Ed., p. 422.)

Hesse has since separated from *Dita* bark two other bases, *Echitamine* and *Echitenine*. He now reports that *Ditamine* exists in the bark in the proportion of 0.04 per cent. It is readily soluble in dilute acids, and differs from the alkaloids associated with it in being precipitated from its acid solutions by ammonia. Its formula deduced from the analysis of its platinochloride, is $C^{14}H^{18}NO^2$.

Echitamine is obtained from the liquor from which the ditamine has been extracted. On neutralizing this liquor, concentrating it by evaporation, and then adding hydrochloric acid and sodium chloride, impure echitamine hydrochloride is precipitated. The base isolated from this precipitate, and then purified, crystallizes in thick vitreous prisms, answering to the formula $C^{22}H^{18}N^3O^4 + 4H^2O$. When dried in vacuo these part with three molecules of water, leaving a strong base of the formula $C^{22}H^{28}N^4O^2 + H^1O$, or $C^{22}H^{29}N^4O^3$, which the author calls echitamine hydrate, or echit-ammonium hydroxide. If in drying the heat be raised to and maintained at $150^\circ C.$, another molecule of water is given off; but the anhydrous echitamine thus left is a much weaker base, and is reconverted into the original alkaloid by dissolving it in hydrochloric acid, and decomposing the hydrochloride. In consequence of the decided loss of basic properties accompanying the elimination of the last molecule of water, the author prefers to regard the monohydrated base as the normal form. The latter is a powerful alkaloid; it neutralizes acids perfectly, and yields well defined crystallizable salts.

Echitenine.—This base is prepared from the mother liquors of echitamine hydrochloride, by precipitating with mercuric chloride, decomposing the precipitate with sulphuretted hydrogen, and then shaking with chloroform. It exists in the bark to the extent of only 0.01 per cent. Its composition corresponds to the formula $C^{30}H^{27}NO^4$. It is markedly bitter, of a brownish colour, and fuses above $120^\circ C$. With strong sulphuric acid it forms a reddish-violet, and with nitric acid a purple solution, the latter of which changes to green and ultimately to yellow. Its salts are amorphous. In the author's opinion all these alkaloids belong to one series:

Ditamine.....	$C^{16}H^{13}NO^7$
?	$C^{19}H^{13}NO^3$
Echitanine	$C^{30}H^{27}NO^4$
Echitamine Hydrate (Echit-ammonium Hydroxide)...	$C^{22}H^{29}N^4O^3$

(Liebig's Annalen, cciii., 144) in Year-Book of Pharmacy for 1881.)
(Pharmacographia Indica, Vol. II, pp. 389—391).

755. *Holarrhena antidysenterica*, Wall., H.F.B.I.
III. 644.

Syn.:—*Echites antidysenterica*, Roxb. 245; *Wrightia antidysenterica*, Graham.

Sansk:—Kutaja (the bark) and Kalinga (the seeds). Girmalli ka, Vatsaka (cow tree), Sakra Sakhin (Indra's tree), Sakra-Sana (Indra's food). The tree is fabled to have sprung from the drops of amrita which fell on the ground from the bodies of Rama's monkeys which were restored to life by Indra. (Pharmacographia Indica II, p. 392).

Vern:—Kureya, kaureya, karra, kaura, kora, karchi, dudhi (Hind.); Kurchi (Beng.); Pandhra kúda, dowla kúda (Bom.);

Lasanulaasfirul-murr (Arab.); Zabâne-kunjaskhe-talkh (Pers.); Kulappalai-virai, veppalei (Tam.); Amkuduvittum (Tel.); Kood-saloo, Korchu (Kan). Letonkgyi (Burm.). The seeds are called Kadwá-indarjow (Hind. and Bomb.); Tita-indarjab (Beng.);

Habitat:—Tropical Himalaya, from the Chenab westwards and throughout the drier forests of India to Travancore.

A small, deciduous tree, glabrous, pubescent or tomentose. Bark $\frac{1}{4}$ in. thick, brown, rough, exfoliating in irregular flakes. Wood white, soft, even-grained. Leaves nearly sessile, 6-12 by $1\frac{1}{2}$ -5 in. elliptic or ovate-oblong, obtusely acuminate, subcoriaceous; secondary nerves 10-16 pairs, strong, arched; petiole $0\frac{1}{4}$ in. Flowers white or cream-coloured, slightly scented, $1\frac{1}{2}$ in. across, puberulous, in terminal corymbose cymes which are 3-6 in. diam. J. D. Hooker says, "the flowers are quite inodorous." Calyx deeply 5-partite, lobes small, lanceolate acuminate, with glands inside at their base. Corolla-tube $\frac{1}{3}$ - $\frac{1}{2}$ in. long, slender, cylindrical, swollen at the base round the anthers, throat contracted, naked; lobes as long as the tube, oblong, spreading, overlapping to the left. Anthers subsessile, inserted near the base of the Corolla-tube. Cells rounded at the base. Carpels 2, distinct; ovules numerous; style short, filiform; stigma oblong. Fruit of 2 distinct, divaricate follicles, 8-16 by $\frac{1}{3}$ - $\frac{2}{3}$ in., spreading and incurved, smooth, usually with white specks. Seeds numerous, $\frac{1}{4}$ in. long, narrowly linear-oblong, glabrous. Coma 2 in., silky, brownish grey, $1\frac{1}{2}$ -2 in. long.

"Sir D. Brandis remarks that in Peninsula specimens the style is much longer than in those of Northern India, and the anthers are attached to the middle of the corolla tube instead of at the base." (Duthie).

Uses:—*Kurchi* bark is medicinally used as a tonic and febrifuge; but it is chiefly esteemed for its antidyenteric properties. That it is always a sure remedy for dysenteric affections; has been borne out by the statements of many medical practitioners, both Native and European. Sub-Assistant-Surgeon A. C. Kastagiri publishes a case in the *Indian Medical Gazette*, vol. I, p. 352, and says that he treated a child, 15 months old suffering from dysentery, with the decoction

of the bark and met with success, after every other medicine had been tried.

He employed a decoction (Bark two ounces, Water Oii. boiled to Oi.). Doses of four drachms, four times a day, with the addition of one drop of Tr. Opii to each dose. Dr. Gibson states that he has employed it extensively as an antiperiodic. It has, however, fallen into disrepute, principally, according to Sir Walter Elliot, who regards it as one of the most valuable medicinal products of India, from the comparatively or wholly inert bark of *Wrightia tinctoria*, R. Br., a tree very similar in general appearance to *H. antidysenterica*, and known by very similar native names, having been often confounded with it. This bark and its properties are well deserving of the notice of future investigators. It may be prescribed in decoction (eight ounces, water two pints boiled to one pint), in doses of one ounce and a half or two ounces twice or thrice daily; but Mr. Odoy Chund Dutt prefers a watery extract of the rootbark, of which the average dose is about three grains, in combination with half a grain or more of opium. The *boat-shaped seeds* (*Anderjow* of the Taleef Shereef, No. 75), are also highly valued by the natives of India in *dysenteric* cases. They are narrow, elongated, about half an inch in length, of a cinnamon brown colour, convex on one side, concave and marked with a longitudinal pale line on the other, easily broken, of a bitter taste, and heavy unpleasant odour. They are often confounded with the seeds of *Wrightia tinctoria*, *Roxb.*, to which they bear a general resemblance. According to Ainslie (*Mat. Ind.*, vol. ii., p. 483), an *infusion of the roasted seeds* is a gentle and safe *astringent in bowel complaints*, and is given to allay *the vomiting of cholera*. In the Taleef Shereef, the infusion is said to be effectual in arresting hæmorrhage from piles. Anthelmintic virtues are also assigned to them. During the last cattle plague epidemic at Backergunge (Bengal) they were extensively employed, being regarded as possessing certain specific virtues (*Indian Med. Gaz.*, 1866, vol. i., p. 352). The results are not stated.

The seeds are considered by the Arabic and Persian writers as possessed of carminative and astringent properties, and are

used in chronic chest affections, such as asthma, and also in colic and diuresis. They also attribute tonic and aphrodisiac properties to the seeds (Dymock.)

The seeds combined with honey and saffron are made into pessaries which are supposed to favor conception. They are also used after delivery, (Pharmacographia Indica, Vol. II, p. 393).

"The bark constitutes the principal medicine for dysentery in the Hindu Pharmacopœia. Before the discovery of the efficacy of Ipecacuanha in this disease, many chronic cases which did not get well under European medical treatment, used to be cured by the Kavirajes, by their preparation of this bark. The seeds are also used in medicine, they being regarded as astringent, febrifuge and useful in fever, dysentery, diarrhœa and intestinal worms. The bark is administered in a variety of ways. The expressed juice of the bark is given with honey. A fluid extract is given with the addition of ginger and *atis*. A compound decoction is also prepared.

"An oil for external application is prepared with sesamum oil, decoction of *kutaja* bark and a number of astringent and aromatic substances in small quantities.

"The seeds enter into good many prescriptions for fever, bowel complaints, piles, intestinal worms, &c." (Dutt, Mat. Med.)

"When in the Goa territory, I observed that the natives used the root-bark only. This is also the case in the Concan, where the root is given in infusion with *Tinospora cordifolia* for fevers of long standing; its juice is also extracted and made into pills with aromatics, as a remedy for diarrhœa and dysentery" (Dymock).

"The bark, dried and ground, is, by the Santals, rubbed over the body in dropsy. The fruit is applied in snake-bite, to allay swelling and irritation, and the seeds yield a medicinal oil" (Revd. A. Campbell).

"Dr. Warden writes that a solution containing the partly purified alkaloid has been used with success in the treatment of fevers and dysentery. Should it even in a smaller degree

possess the specific properties of Quinine and Ipecacuanha, a most valuable drug would be added to our remedies for tropical diseases" (Watt).

"In dysentery the seeds would seem to be given for the most part in decoction. This was prepared as follows: $\frac{1}{2}$ to 3 drachms of the seeds were placed in 12 oz. of water, boiled down to 4 oz. and strained. The fluid thus obtained was given in one dose and this was repeated every morning," (p. 72, First Rept. Ind. Drugs, Com.).

According to the late Dr. Amulya Charan Basu, in the very acute stage of dysentery, the bark does more harm than good. It should be used when the more acute symptoms have passed off and in the chronic form of the disease. Only the fresh bark should be employed. Barks even a few days old are almost useless. Liquid extracts and other preparations made from the fresh bark keep well and may be used when the fresh bark is not available. (p. 148, First Rept. Ind. Drugs Com.)

"The powdered bark suspended in a strained decoction or infusion of *Plantago ovata* is very efficacious in dysentery, where Ipecacuanha cannot be tolerated. (First Ind. Drug. Com. Rept. p. 159).

Chemical composition.—The bark and seeds contain a basic substance (Wrightine), to prepare which the pulverised seeds are treated with carbonic disulphide in a displacement apparatus to remove a fat oil, then dried and exhausted with hot alcohol; the extract freed from alcohol by distillation, is digested with a small quantity of dilute hydrochloric acid, and the evaporated filtrate is mixed with ammonia or sodic carbonate, which throws down a copious flocculent precipitate, consisting of the impure base.

Wrightine after washing with cold water forms an amorphous powder, insoluble in ether and in carbonic disulphide, soluble in water and alcohol, and especially in dilute acids, with which it forms uncrystallisable salts having like the base itself a persistent bitter taste. The acetic acid solution is precipitated by tannic acid; the hydrochloric acid solution gives flocculent precipitates with platinic, auric, and mercuric chlorides. (Stenhouse, *Phar. Jour.* (2), V. 493.) R. Haines (*Ibid.*, VI., 432) states that he obtained the same base from Conessi bark in 1858, and gave a short description of it in the *Transactions of the Medical and Physical Society of Bombay* (New Series IV., 38). He proposed to call it Conessine, and calculates, from the analysis of the free base, and of the platinum salt, the formula $C^{11}H^{11}NO$.

The seeds have recently been again investigated by Herr Warnecke (*Berichte*, XIX, 60), who has obtained from them a crystalline alkaloid by exhausting them with ether containing a little hydrochloric acid, digesting the extract with water and precipitating with ammonia, washing the yellow flocculent precipitate with water, and then after drying it over Sulphuric acid dissolving it in petroleum spirit and evaporating. The pure alkaloid is described as occurring in delicate colourless anhydrous needles, having a bitter taste, becoming yellow at 60° to 70°C., and melting at 122°C. The alkaloid readily forms salts with acids, the hydrochlorate being crystalline. It is difficultly soluble in water, but freely soluble in alcohol, ether, chloroform,

petroleum spirit, benzol, amyl alcohol, and carbon bisulphide. An analysis gave figures corresponding with the formula $C_{11}H_{13}N$. For this he assigns the name "*Wrightine*." (*Pharmacographia Indica* Vol. 11, pp. 395-396).

"It appears desirable that the investigation should be extended to the bark and seeds." (*Ph. J.* Feb. 27, 1886).

756. *Tabernæmontana dichotoma*, Roxb. H.F.B.I., III. 645; Roxb. 248.

Vern.:—Pili-karbir, Kener zard (Pb.); Caat-aralie (Tam.); Odallam (M.).

Habitat:—Deccan Peninsula; common in the Western Ghats.

A small tree. Wood yellowish white, moderately hard. Milk not acid. Branches dichotomous. Bark pale-grey, smooth. Branchlets marked with scars of fallen leaves. Young parts covered with a shining resinous coat. Leaves numerous, 4-7 or even 10in., elliptic-oblong, or lanceolate-oblong, tapering to base, suddenly and shortly acuminate, obtuse, stiff and coriaceous, dark-green above, paler beneath, lateral veins numerous, horizontal, parallel, depressed above, prominent beneath. Petiole $\frac{1}{2}$ -1 $\frac{1}{4}$ in., stout. Flowers few, white, throat and tube yellow, very sweet-scented, on long, stout pedicels; cymes in axils of terminal pair of leaves, lax; peduncle 2-6in., stout, glabrous: bracts small ovate, fleshy, adpressed. Calyx fleshy at base, segments rounded, glabrous: Corolla 1 $\frac{1}{2}$ -3in. diam: tube $\frac{3}{4}$ -1in., fleshy, lobes considerably longer oblong, obtuse, falcately twisted, often crisped at margin. Anthers acute. Ovary glabrous, style clavate; ripe carpels about two in., pendulous, horizontally-divaricate or reflexed, broadly ovoid, blunt, flat on dorsal, rounded on vertical side, smooth, orange-yellow. Seeds $\frac{3}{4}$ in., finely striate, surrounded by a coat of crimson pulp.

Use:—The seeds are said to be powerfully narcotic and poisonous, producing delirium and other symptoms similar to those caused by *dhatūra* (Ainslie).

They are said by Lindley to be purgative. The leaves and bark act as purgatives, and are believed to be used in Java as substitutes for senna; the milky sap is also described as cathartic (Watt).

757. *T. Heyneana*, Wall., H.F.B.I., III. 646.

Vern.—Naglkud, pandra-kura (Mar); Bili kodsalo; nagarkooda; halmeti; maddarsa (Kan).

Habitat.—Western Ghats, from the Concan southwards, common.

A small glabrous tree. Bark "grey, rough, with much milky juice," says Brandis, whereas Gamble says that the bark is smooth grey. J. D. Hooker says the bark is pale smooth and grooved when dry. Wood light-grey, or white. Branches very stout. Leaves 3-8 by 1-2½ in., coriaceous linear-oblong or linear-lanceolate, obtusely acuminate, dark-brown and shining above when dry, paler beneath; midrib and nerves beneath stout. Nerves 12-16 pair, arched. Petiole ½-¾ in., base dilated. Peduncle 1-2 in.; pedicels ¾-1 in.; bracts obsolete. Cymes many-fid. Calyx very coriaceous; lobes hardly ovate, obtuse, crisped. Ovary very short; style filiform, top obconic; stigma forked. Follicles yellow, smooth, very variable, ½-1 in. long, sessile, slightly recurved, shortly banana-shaped (K.R.K.), not keeled or ribbed, beaked or not. Seeds 2 or more, ½ in. long.

Uses.—The authors of the *Pharmacographia Indica*, vol. II, p. 413, write that this species is considered to have similar properties to those of *T. coronaria*, Br., and is known by the same vernacular name. In Puddukota, the flowers are used in inflammation of the cornea.

758. *T. Coronaria*, Br. H.F.B.I., III. 646. Roxb. 249.

Sans. :—Tagara; Naudivriksha (Ainslie). "*Firki-tugar* the Hindoo name of the single flowered, and *Bura-tuyar* of the double flowered." (Roxb).

Vern. :—Sagar; Tagar (Mar. and Guz.); Grandi tagarapu, Nandi-vardana (Tel.); Chandni, Taggai, Taggar (H.); Tagar (B.); Asuru (Nepal); Krun (Lepcha); Nagui-kada (Kan.).

Habitat.—Much cultivated in gardens throughout India, from the N. W. Himalaya in Kumaon, Eastward and Southward, Ceylon.

An evergreen, glabrous shrub, 6-8ft., even 10-15ft. Bark silvery grey. Wood white, moderately close-grained. Branches many, slender, dichotomous. Leaves membranous in each pair unequal, the larger 5-6 by 1-1½in., glossy, green, when dry pale beneath; elliptic-oblong, obovate or oblanceolate obtusely acuminate or cordate, margins waved, nerves 6-8 pair, narrowed into a petiole ¼-½in., axils of petioles glandular. Peduncles solitary or in pair, 1-2in., pedicels slender. Flowers pure white, fragrant, at night, often double, buds clavate. Calyx small. Calyx-lobes broadly ovate, acute. Corolla-tube ½-1in., glabrous, dilated slightly below the middle, limb 1-1½in. diam; lobes obliquely ovate, obtuse, margins curled; mouth, with 5 glands. Anthers inserted below the middle of the tube. Ovary glabrous. Follicles 1-3in., spreading and recurved, sessile or contracted into a sort of stalk at the base, turgidly oblong, beaked or not, 3-ribbed. Seeds 3-6, oblong, striated; axil red, fleshy. The red axil may give a dye, says Gamble. I have not seen the double variety bear any fruit in Bombay or the Konkan (K.R.K.).

Use:—The wood is employed medicinally as a refrigerant. (Irvine).

The milky juice mixed with oil is rubbed into the head to cure pain in the eyes; the root chewed relieves toothache; rubbed with water, it kills intestinal worms; with lime juice it removes opacities of the cornea. (Rheede). It is very cooling in ophthalmia. (Ainslie). In Western India the milk has the reputation of being very cooling, and is applied to wounds to prevent inflammation. (Dymock.)

The fresh roots were extracted with 80 per cent alcohol. From the alcoholic extract, in addition to resins and extractives, a large amount of an alkaloida principle was isolated, soluble in ether, and giving marked precipitates with alkalis, chromate of potash, and alkaloidal reagents, but no special colour reactions were noted. The taste was bitter, and the principle as deposited by spontaneous evaporation of an ethereal solution, was in the form of a yellowish brittle varnish. (Pharmacographia Indica, Vol. II, p. 414).

759. *Vallaris Heynei*, Spreng. H.F.B.I., III. 650.

Syn:—*Echites dichotoma*, Roxb. 247.

Sans :—Bhadravalli, bhadramunja, visâlyakrit.

Vern :—Râmsar ; Chamari-ka-vel (H.) ; Hápar máli ; Râmsar (B.) ; Dudhi (Kumaon), Pulta podara yarála, pala malle tivva (Tel.).

Habitat :—The Himalayan tract, from the Ganges eastward, Central and South India. (Commonly cultivated in India).

Tall, twining shrubs, with ash colored bark and cymose flowers. Leaves, elliptic or oblong or linear-oblong, acuminate, pellucid, dotted, $1\frac{1}{2}$ -4 by $\frac{3}{4}$ -1 $\frac{1}{2}$ in., glabrous or pubescent. Petiole $\frac{1}{2}$ - $\frac{3}{4}$ in. The axils of the petioles glandular. Cymes 5-10-fid., sessile or peduncled, dichotomous much shorter than the leaves. Flowers pure white $\frac{2}{3}$ in., diam., fragrant. Sepals ovate oblong obtuse equallying the short corolla-tube. Corolla-limb spreading. Disk ciliate. Filaments line or, villous. Anthers woolly. Style pubescent, Follicles 6 by 2 in., straight tapering from a rounded base to a stiff point, splitting into 4 valves when dry (Roxb). Pericarp thick, fibrous. Seed lin., ovate, beaked, with a tuft of pairs at hilum, Coma very long, silvery white.

Uses :—The milky juice is employed as an application to wounds and old sores in the U. P. (Atkinson).

The milky juice is a mild irritant. Applied to old sores and sinuses, it excites some degree of inflammation in them and thereby expedites the process of healing (Assist-Surg. R. C. Gupta, in Watt's Dictionary).

760. *Wrightia tinctoria*, Br. H.F.B.I., III. 653.

Syn. :—*Nerium tinctorium*, Roxb. 243.

Sans. :—Hayamáraka.

Vern. :—Indarjou (H. and B.) ; Kála kado, kala-kuda, kuda, khirni, bhúrkúri (Bomb.) ; Pálá, veypale, pila, pilá (Tam.) ; Tedlapál, tellapal, amkudu (Tel.) ; Kodmurki, Kuda, beppalli, pale (Kan.) ; Kota kappála (Malay.).

Habitat—Central India, throughout the Western Peninsula, Rajputana. Thrives on Mount Abu, Burma.

A small, deciduous tree. Bark $\frac{1}{2}$ in. thick, grey, corky. Wood white, moderately hard, even-grained. Twigs glabrous, pubescent. Leaves membranous, elliptic-ovate or lanceolate or ovate-oblong, obtusely acuminate or caudate, 3-5 by 1-1 $\frac{1}{2}$ in.; nerves 6-12 pair, faint till the leaves are old, then strong beneath, base acute or rounded; petiole very short. Cymes sometimes 5 in. diam., with slender, spreading, dichotomous branches; bracts minute. Flowers white or cream-coloured, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. Sepals ovate-obtuse. Corolla-lobes linear-oblong. Scales linear, scattered. Stamens large. Follicles 6-8 in. long or more, cylindric, slender, smooth, tips adhering. Seeds $\frac{1}{2}$ - $\frac{3}{4}$ in., glabrous, except for the coma, linear.

Uses.—The root-bark and seeds are adulterated with, and also used as substitutes for *Holarrhena antidysenterica*.

“The bark may be distinguished from the true *Conessi* (*Holarrhena antidysenterica*) bark by its darker color, and by its not exfoliating in patches (absence of rhytidoma); the seeds by their want of bitterness. The bark is used as a tonic and the seeds as an aphrodisiac; both are articles of commerce, the former being more frequently met with in the shops than true *Conessi* bark.” (*Pharmacographia Indica*, Vol. II, p. 398).

761. *W. tomentosa*, *Ræm. and Schult.*, H.F.B.I., III. 653.

Syn.:—*Nerium tomentosum*, *Roxb.* 243.

Vern.:—Dudhi, dharauli, दौरा, Kâla inderjau (H.); Dudh-koraiza (B.); Sandi-kya (Kol.); Atkura, burn machkunda (Santal); Dudhi, kilâwa, keor (Pb.); Dudhi, kadu-inderjao, दौरा (Bomb.); Kalu inderjau (Mar.); Tâlla pal, koila mukri, koyila mokiri, putta jillêdu, pedda pâla (Tel.) Bile kude, gidda (Kan).

Habitat:—Throughout India, extending in the Sub-Himalayan tracts Westward. Eastward to Sikkim. In Dun and Saharanpur Forests. Rajputana plentiful on the Hill Road to Mount Abu, in fruit, in November. Behar, Assam, Chittagong, Burma, Ceylon.

A small, deciduous tree, with grey corky bark, $\frac{1}{2}$ in. thick. Wood white, moderately hard, even-grained. Extremities tomentose. Leaves opposite, distichous, 3-6 by $1\frac{1}{2}$ -3 in. elliptic, caudate, acuminate, rarely obscurely serrulate, rather membranous, velvety-tomentose often on both surfaces, always beneath, narrowed into a petiole $\frac{1}{2}$ - $\frac{3}{4}$ in. long, lateral nerves 10-16 pair. Flowers lin. across, in many-flowered corymbose; terminal cymes; bracts deciduous. Calyx short, with 5-10 scales inside at base; lobes rounded, half the length of the Corolla-tube. Corolla pale, yellow with a fleshy orange-coloured corona of scales; lobes oblong, over-lapping to the left. Stamens inserted at top of Corolla-tube; filaments short and broad, continued into a broad—tapering connective; anthers sagittate, by the cells being spurred at base, adherent to stigma. Ovary of 2 connate carpels. Style filiform, stigma ovoid. Fruit of 2 connate follicles, 8-12 by $\frac{1}{2}$ - $\frac{3}{4}$ in., straight, cylindric, laterally, compressed, rough, with white specks, follicles separating before dehiscing. Seeds numerous, $\frac{1}{2}$ - $\frac{3}{4}$ in., slender, each with a tuft of white silky hairs at lower end (Kanjilal). Flowers have an unpleasant smell, says Trimen, first yellowish, afterwards purple.

Uses.:—A thick, red-colored medicinal oil is said to be obtained from the seeds. In Chutia Nagpur, a preparation from the bark is given in menstrual and renal complaints (Campbell).

The bark and root-bark are believed to be useful in snake-bite and scorpion stings.

762. *Nerium odorum*, Soland. H.F.B.I., III. 655. Roxb. 242.

Sans.:—Karavira.

Vern.:—Diffi (Arab.); Khar-zahrah (Pers.); Kanér, kanél, karbêr (Hind.); Kanira, kaner, ganhira (Pb.); Kanyúr (Kumaun); Alari (Tam.); Gannéru (Tel.); Alari (Mal.); Kanagale (Kan.); Karabi (Beng.); Kanhéra (Bomb.). *Haya-mâra*:—Killer of the horse (Marathi.)

Habitat:—Western Himalaya, from Nepal to Murree, Central India and Sind.

A large, erect, stout, glabrous evergreen shrub, containing a cream-coloured sticky resinous juice. Root crooked. Stem 6-8ft. Woody, pithy in the centre. Bark thick, corky, soft, with a grey surface externally; in young branches green. Leaves ex-stipulate, in whorls, rarely opposite or scattered, narrow linear-lanceolate; 4-6in. long, thickly coriaceous, acuminate, entire, revolute, midrib very stout, main lateral nerves numerous, slender, horizontal, parallel, very close. Petiole very short. Flowers hermaphrodite, showy, sweet-scented, single or double, variously coloured, $1\frac{1}{2}$ in. diam., salver-shaped. Cymes racemose. Peduncles terminal, long angular; pedicels short; bracts, deciduous, coloured. Calyx inferior, 5-partite, tubular, persistent, slightly acerescent. Segments subulate, lanceolate, erect; base of the Calyx-tube glandular within. Corolla 5-lobed, twisted, hypogynous, gamopetalous, regular, deciduous. Corona of each petal 3-fid, laciniate. Stamens 5, alternate with the lobes of the Corolla, included; filaments attached to the tube the whole way down. Anthers sagittate, introrse, united to the stigma, 2-celled, dehiscing longitudinally. Connective, feathery more than twice the length of the anthers. The feathery processes are spirally twisted into a bundle projecting beyond the Corolla-tube. Pollen globose. Ovary superior, of two carpels, separable in fruit. Style single, uniting the ovaries. Stigma hour-glass or dumb-bell-shaped. Fruit cylindric, capsules in pair, with deep linear striations, slightly twisted, 6-9in. long. Seeds numerous, compressed, exalbuminous, with a tuft of fine, shining, white, and greyish silky hairs; fusiform, slightly rugose.

Uses:—"Roots used in skin diseases and inflammatory affections. It has several synonyms in Sanskrit, signifying *horse-killer*, seems to be used for destroying horses. The root, beaten into a paste with water, recommended to be applied to chancres and ulcers on the penis (Sārangdhara). Fresh juice of the young leaves poured into the eyes in ophthalmia with copious lachrymation (Chakradatta)." (U. C. Dutt's M. M., p. 191).

All parts of the plant, especially the root, are recognized by the natives as *poisonous*, and, as such, are used for criminal and *suicidal purposes*; yet we find, in the Taleef Shereef (p. 129),

and other works on Indian Materia Medica, that it is prescribed in leprosy and other diseases. It is mentioned here chiefly with the view of enforcing caution in any trials which may be made with it, as in over-doses it is productive of serious and even fatal effects. Two interesting cases of poisoning with it are recorded, one by Dr. J. Broughton (*Bombay Méd. Phys. Trans.*, vol. iv., N. S. p. 4, in Appendix), and the other by Dr. A. Greig (*Indian Annals of Med. Science*, vol. ii., p. 295). In the latter, which proved fatal, death, according to Dr. Grieg, was due to the directly *depressing* influence which the drug exercised on the *nervous system*. A case in which *tetanic symptoms* followed, the exhibition of the root-bark is recorded by Mr. Kamikhya Nath Acharjee (*Indian Med. Gaz.*, 1866. vol. i., p. 218).

The Mahomedan physicians describe the root as the most powerful resolvent and attenuant, only to be used externally; taken internally, it acts as a poison upon men and animals. A decoction of the leaves is recommended to reduce swellings, and an oil prepared from the root-bark in skin diseases of a scaly nature, and in leprosy (Dymock).

The bark of the root, and the sweet-smelling leaves of this shrub, are considered by the Vytians as powerful repellents, applied externally. The root itself, taken internally, acts as a poison, and is but too often resorted to for the purpose of self-destruction, by the Hindoo women, when tormented with jealousy (Ainslie).

The active principles of *N. odorum* are powerful heart poisons. Prof. E. Pelikan suggested that the drug, owing to its depressing influence on the heart, might be given as a substitute for digitalis (Watt's Dictionary).

Nereium Oleander, is hardly different from the Indian plant. According to the examination of the sap, bark and seeds of the Oleander by—A Lenhar. *J. Pharm Chim*, 1912, 5, 108-116, all parts of the oleandar plant with the exception of the sap, contain a toxic glucoside *l-strophanthin*. This substance known formerly as *neriin* has the same composition as *strophanthin*, and is closely related to it. *I. Ch. J.* 29th Feb. 1912, p. 202.

The following active principles may be mentioned as described by Sohn (Dictionary of the Active Principles of Plants, p. 65, 1894):—

1. *Oleandrine*.—Alkaloid. ? [*Neriodorin*, (Schmiedeberg); identical with one

of Selmis's Ptomaines (*Finoshi*); statements of different observers concerning *Oleandrine*, *Neriin*, *Neriodorin*, &c., are conflicting; see Leukowsky, *Rep. Chim. Appliq.*, III, 77; Schmiedeberg *Archiv., Exp. Pathol.*, XVI, 151; Greenish, *Pharm. J., Trans.*, 3rd Ser., XI., 873, and others] Amorphous, yellow, resinous, bitter, poisonous. After heating to 240° C. it is no longer soluble in alcohol or water. Melting point above 56° C. with crystalline sublimate. Soluble in water, Betelli; alcohol, ether, chloroform and fatty oils.

Neriodorin scarcely soluble in water or ether, not soluble in benzene or petroleum ether. For further information regarding the precipitants, see Sohn.

2. *Neriin* has all the properties of Digitalin and possibly identical therewith.

3. *Nerianthin* bears similar resemblance to Digitalin.

4. *Rosaginin*.—A Glucoside (*E. Pieszeck*). Amorphous, *Archiv. Pharm.*, 1890, 352; poisonous; action like Strychnine. Soluble in alcohol; not in water, ether, chloroform or petroleum ethers. For further tests, see Sohn.

The presence of the Glucoside *Rosaginin* would seem to account for tetanic symptoms noticed in two cases reported in the *Indian Medical Gazette* of 1866.

Dregendorff recognizes *Oleandrine* as the alkaloid found in the plant, but says he is not familiar with it and refers the reader to the researches of Leukowsky.* Dymock, in referring to the researches of Leukowsky says that the latter recognizes in the leaves of oleander the presence of two alkaloids—namely, *Oleandrine* and *Pseudo-curarine*. Dymock further quotes the researches of Schmiedeberg, which, in view of the quotation from Sohn given above, referring to the difference of opinion as regards the nature of the true alkaloid, may well be repeated here. "Schmiedeberg (1883), who considers *Oleandrine* to be a glucoside, found in the leaves two other glucosides—*Neriin* and *Nerianthin*; he considers *Neriin* to be identical with *Digitaline*."†

Greenish recognizes two bitter principles in the bark, *Neriodorin* and *Neriodorin*, which, he says, are closely allied non-nitrogenous substances, probably glucosides, both possessing the properties of powerful cardiac poisons. In the bark, he says, there are crystals of calcium oxalate. (*Year Book of Pharmacy*, p. 154, 1881).

763. *Aganosma caryophyllata*, G. Don., H.F.B.I., III. 664.

Habitat:—Lower Bengal, Monghyr; common on rocks at Risikund; Dekkan Peninsula; frequent on the Veligonda Hills of Cuddapah.

A large, evergreen climber. Stem very stout. Shoots pubescent. Leaves 4-5 by 2-2½ in., ovate or elliptic, coriaceous, acute, obtuse or acuminate, glabrous or tomentose beneath,

* Plant Analysis translated by Greenish, p. 204, 1884.

† Pharmacographia Indica, p. 401, Vol. II, 1891.

base rounded, acute or subcordate, nerves strong beneath and all running toward the point in three oblique pairs. Petiole $\frac{1}{4}$ - $\frac{1}{2}$. Cymes terminal, lax, white—tomentose. Pedicels shorter than Calyx-lobes which are hoary without. Sepals red, $\frac{3}{4}$ in. long, linear-lanceolate, glandular within. Corolla white, tube 5-ribbed, $\frac{1}{2}$ in. long; lobes obliquely orbicular; tube and throat both cylindric, sub-equal, limb $1\frac{1}{2}$ in. diam. Ovary pubescent at tip. Style slender, top lanceolate, stigma columnar, to the tip of which the anthers are attached. Follicles 3-5 in., stout, nearly $\frac{1}{2}$ in. diam.; pericarp thickly coriaceous. Seeds (unripe) ovate-oblong, $\frac{1}{2}$ in. long, flat. Ovary wholly included in the tubular 5-lobed disk (J. D. Hooker).

Use:—Used for the same purposes as *A. calycina*.

764. *A. calycina*, *A. Dc.* H.F.B.I., III. 664.

Syn.:—*Echites caryophyllata*, *Roxb.* 245.

Sans.:—Málati.

Vern.:—Málati.

Habitat:—Tavoy; Gomez.

A stout, evergreen climber. Branches pubescent. Leaves 3-4 in., coriaceous, elliptic or oblong-lanceolate, acuminate, glabrous, nerves 7-10 pairs, arching, slender. Petiole $\frac{1}{2}$ in. Cymes many—fid, densely rusty-tomentose, lax, terminal. Peduncle and pedicels stout. Sepals $\frac{3}{4}$ -lin., eglandular. Corolla-tube $\frac{1}{2}$ in. long, hoary, slender, cylindric, base hardly dilated, narrowed upwards to the mouth, villous within; Corolla-lobes ovate-acute. Ovary quite glabrous. Style elongate-clavate, truncate; stigma columnar. Fruit unknown (J. D. Hooker).

Use:—According to Sanskrit authors, this plant is heating and tonic; useful in diseases caused by disordered bile and blood (U. C. Dutt).

765. *Trachelospermum fragrans*, *Hook.*, H.F.B.I., III. 667.

Vern.:—Dudhi (Kumaon).

Habitat:—Temperate and subtropical Himalaya, from Kumaon to Bhotan, exclusive of Sikkim. Assam; Muku hills; Cachar.

A tall, nearly glabrous, climbing shrub. Shoots and petioles sometimes pubescent; old stems with tubercled bark; branches pendulous. Leaves 3-5 by 1-1½ in., opposite, elliptic-lanceolate, obtusely acuminate. Petiole ½-⅝ in. Flowers white or pink, fragrant. Cymes loosely paniced; peduncles very slender, 1-3 in., stout, angular, trichotomously branched. Bracts, minute, lanceolate. Pedicels slender. The cymes in upper axils; long-peduncled. Sepals ¼-½ in., the length of the Corolla-tubes, ovate or lanceolate. Corolla salver-shaped, twisted in bud, tube slender, with the throat ⅓-½ in.; lobes at the base and mouth pubescent, obcuneate, obliquely truncate. Anthers spurred at base, included. Disc-glands quadrate. Ovary glabrous, acute. Follicles 4-9 by ¼ in., incurved and converging, cylindric, acuminate, narrowed at the base. Pericarp thinly coriaceous, smooth, pale. Seeds ⅔ in. long, slender, compressed, obtuse at both ends, pale smooth, coma as long, white (J. D. Hooker, Duthie and Kanjilal).

Use :—According to Atkinson (Gazetteer of the Himlayan Districts, Vol. I, p. 726), it is said to possess properties similar to those of *Alstonia scholaris*, for which it is used as a substitute in Kumaon.

766. *Anodendron paniculatum*, A. Dc., H.F.B.I.,
III. 668.

Syn. :—*Echites paniculata*, Roxb. 247.

Vern. :—Kâvali (M.). Lamtâni (Bomb.).

Habitat :—From Sylhet to Martaban, Deccan Peninsula; on the Western Ghats, from the Concan southwards.

A very large, woody climber. Stems reaching 3 or more in. in diam., much dichotomously branched. Bark greyish-brown, young parts glabrous. Leaves opposite, 4-8 by 1½-3 in., elliptic or oblong or oval-oblong, rounded at base, shortly and suddenly acuminate, obtuse, glabrous and shining on both sides, thinly coriaceous; lateral veins numerous, 12-15 pairs, prominent beneath. Petiole ½ in. Flowers very small, pale, dull, orange or yellowish white, on slender, glabrous pedicels, numerous. Cymes large, lax, trichotomous; bracts small, ovate, deciduous. Calyx-

segments minute, ovate, acute, slightly ciliate. Corolla $\frac{1}{8}$ in. long (J. D. Hooker), $\frac{1}{2}$ in. diam. (Trimen); lobes twice as long as the tube, narrow, falcate, obtuse, throat villous, scattered, white hair on upper surface. Stamens, with very short broad filaments. Stigmas sessile, pointed. Follicles 5-6 in., divaricate, ovate-oblong, cylindrical, blunt, glabrous, hard and woody, black at times, narrowed from a base of $\frac{3}{4}$ in. diam. to the obtuse point, terete. Seeds few, 8-12, $1\frac{1}{4}$ in. long, flat; beak long, about $\frac{1}{4}$ the seeds length, slender, coma white, 2 in. long. The stems afford a very strong fibre.

Use:—The root possesses similar properties to Ipecacuanha (S. Arjun).

767. *Ichnocarpus frutescens*, Br. H. F.B.I., III. 669.

Sans.:—Sárivá.

Vern.:—Syâmlatâ (B.); Káli dudhi, belkamu (Sabaranpur), bamar (Gorakhpur); Nalatiga (Tel.); Bhorí (C. P.). Krishna Sarwa, Kantebhouri (Mar); Gorwi balli (kan).

Habitat:—Western Himalaya; Sirmore to Nepal; Upper Gangetic plain, from Dehli to Bengal, Assam, Sylhet, Chittagong, and the Deccan Peninsula.

An extensively climbing, evergreen shrub; much-branched. Branchlets long, slender, white like finely fulvous-tomentose. Leaves $1\frac{1}{2}$ -2 $\frac{1}{2}$ in., elliptic oblong-lanceolate, or ovate-oval, rounded at base, acute, 2-3 by $\frac{3}{4}$ -1 $\frac{1}{2}$ in.; dark green glabrous and shining above, pale and more or less pubescent beneath, with slender reticulations between the main lateral nerves. Petiole $\frac{1}{4}$ - $\frac{1}{2}$ in. Cymes 1-3 in., axillary and in terminal panicles, rusty pubescent; branches short, trichotomously divided, or 3-flowered. Pedicels longer or shorter than the Corolla. Flowers greenish-white, more or less scented (Brandis), yellow (Trimen). Calyx-lobes ovate, obtuse, or subacute, eglandular, hairy. Corolla about $\frac{1}{2}$ in., diam., purplish (J. D. Hooker), twice as long as the Calyx; $\frac{1}{2}$ in. long, says Brandis; lobes falcate, acuminate, woolly on the upper side. Disk of 5 linear lobes. Follicles spreading, 2-5 in. long. Seeds not rostrate, with a tuft of hairs at the upper end; $\frac{1}{2}$ in. long, coma as long, scanty, white. Pericarp thinly coriaceous.

Uses.—The root is considered to possess alterative tonic properties, and has been employed as a substitute for Sarsaparilla (Ph. Ind.) The stalks and leaves are used in the form of decoction in fevers (Watt).

The roots are somewhat similar in appearance to those of *Hemidesmus*, but have not the same coumarin odour. The bark is of a dark brown colour, and adheres closely to the wood, which is much harder, and differs in structure from that of *Hemidesmus* in having a large central pith. The roots are seldom branched but here and there a few fine fibres are given off; they are almost tasteless. For the properties and use of this plant, the reader is referred to *Hemidesmus*.

Chemical composition.—The roots contain a caoutchoulike substance soluble in benzol, and a soft, brown tenacious resin soluble in ether. Treated with alcohol the powdered root affords about 10 per cent. of dry extract, containing red colouring matter, tannic acid and a small quantity of coumarin. The tannic acid strikes a green colour with ferric chloride and if to this green mixture a drop of soda solution is added, a bright, blue zone is seen to surround the red coloured spot formed by the alkali. This reaction is peculiar to cinchotannic acid. No alkaloidal body could be detected in this drug. (*Pharmacographia Indica*, Vol. II. p. 424).

N. O. ASCLEPIADEÆ.

768. *Hemidesmus indicus*, Br. H.F.B.I., IV. 5.

Syn. :—*Asclepias pseudo-sarsa*, Roxb. 254.

Sans. :—Ananta; Sugandhi; Gopi-mûlam; Sâriva.

Vern. :—Magrabu, jangli-chanbelli, hindi-sâlsâ (H.); Ananta-mûl (B.); Sugandi-pálá, nannári, nát-ká-aushbah (Dec.); Upalsára (Bomb.); Anantamûl, upalasari (Mar.); Nannári, (Tam.); Gadisugandhi, pála-chukkani-déru, sugandhipála, tella sugandhipála, pásasugandhi, muttapulgam (Tel.); Sogadaheru, sugandha-pálada-gida (Kan.).

Habitat :—Northern India, from Banda to Oudh and Sikim, and southwards to Travancore.

Twining shrubs. Leaves opposite, hairy, or pubescent beneath. Leaves most variable in form, length, and breadth; from broadly obovate to oblong, elliptic, linear or linear-lanceolate, obtuse, or apiculate; the shorter and broader 1-1½ by 1-1½ in., the longer 4 by ½ in., the broadest sometimes retuse at the tip, the narrowest finely acuminate, those on the young shoots often white along

the stout midrib; veins reticulate. Petiole $\frac{1}{4}$ in. Pedicels short, clothed with ovate acute imbricating bracts. Calyx $\frac{1}{10}$ in., long, glabrous outside; lobes ovate, acute, margins ciliate. Corolla $\frac{1}{2}$ in. diam., rotate, green without, purple within, tube very short, lobes fleshy, ovate-oblong, acuminate, valvate. Follicles 4-5 in. Seeds $\frac{1}{2}$ in., ovate-oblong, flattened, black; coma lin., pure white.

Parts used:—The root; juice.

Uses:—In the more southern parts of the Concan, the milky juice is dropped into inflamed eyes; it causes copious lachrymation, and afterwards a sensation of coolness in the part. The root is tied up in plantain leaves and roasted in hot ashes; it is then beaten into a mass with cumin and sugar and administered with *ghi* as a remedy in heat or inflammation of the urinary passages. As a *lêp*, the root is applied to swellings (Dymock).

The root is prescribed usually in the form of syrup. Sometimes the whole plant is pounded and a *congee* made with rice, or an infusion prepared of the dried leaves (Watt).

Roots are officinal in the *Indian Pharmacopœia*, and are used as a substitute for sarsaparilla. "They are said to be sweet, demulcent, alterative, diaphoretic, diuretic and tonic. Useful in loss of appetite, disinclination for food, fever, skin diseases, syphilis and leucorrhœa" (Dutt's *Materia Medica*).

"In chronic cough and diarrhœa, the hot infusion with milk and sugar acts as an alterative and tonic, specially in children" (Dr. R. L. Dutt in Watt's Dictionary).

The aroma and taste of the drug is due to the presence of coumarin which can be obtained in part by boiling the root with water. Crystals of coumarin can be prepared from the residue after distillation by drying and extracting with alcohol. This is no doubt the substance obtained by Garden in 1837 and called *smilasperic acid*, and subsequently by Scott in 1843, who described it as a crystalline *stearopten*.

(*Pharmacographia Indica*, Vol. II. p. 448).

769. *Periploca aphylla*, Dcne. H.F.B.I., IV. 12.

Vern.:—Bâta, barri, barrara (Pb.); Shabbi, barrarra (Pushtu); Hum, huma (Afg.); Um, nuna (Bel.); Buraye (Sind.).

Habitat:—Baluchistan, Trans-Indus, Salt Range, Outer Himalaya to the Chenab; Merwara.

An erect branching shrub with milky juice, leafless or nearly so. Stems many, as thick as a goose-quill or less, smooth or with pubescent tips. Leaves (when present) $\frac{1}{4}$ in long, thick, ovate or oblong, acute, nerves inconspicuous. Cymes many-flowered, often opposite, $\frac{1}{2}$ -1 in. long and broad, on short thick peduncles or branching from the base; bracts ovate-oblong, caducous from above the base. Flowers fragrant. Calyx glabrous, $\frac{1}{8}$ in. long; lobes ovate-oblong, obtuse. Corolla greenish and glabrous outside, purple within; lobes reflexed, $\frac{1}{4}$ in. long, oblong, obtuse, densely bearded inside towards the apex. Corona-lobes $\frac{1}{4}$ in. long, transversely oblong at the base, each terminating in a long filiform process with a recurved apex. Stamens with glabrous filaments. Follicles on short thick peduncles, widely divaricate, 3-7 in. long, woody, terete tapering to a point. Seeds $\frac{1}{4}$ in. long, coma 1 in. long. (Duthie).

Use:—The milky juice is used in Sind as an external application to tumors and swellings (Murray).

770. *Secamone emetica*, Br. H.F.B.I., IV. 13.

Vern.:—Shada-bûri (B.).

Habitat:—Mountains of the South Deccan Peninsula.

A diffuse, semi-shrubby, perennial herb. Stems numerous, slightly twining, slender, wiry, glabrous, cylindric, much thickened at nodes. Leaves 2-2 $\frac{1}{2}$ in., linear-lanceolate or linear, acute at base, tapering and very acute at apex, glabrous. Petioles short, slender, 1 $\frac{1}{2}$ -3 by $\frac{1}{8}$ - $\frac{1}{4}$ in., rather glaucous beneath, nerves faint (J. D. Hooker). Flowers yellow, on slender, pubescent pedicels. Cymes stalked, lax, dichotomous, bracts small, woolly pubescent. Calyx pubescent, segments ciliolate. Corolla under $\frac{1}{4}$ in. diam., lobes oblong-oval, obtuse. Follicles 2-3 in., much acuminate, smooth.

Use:—Regarded by natives as possessing powerfully emetic properties (Ph. Ind.).

771. *Oxystelma esculentum*, Br. H.F.B.I., IV. 17.

Syn.:—*Asclepias rosea*, Roxb. 254.

Sans. :—Doogdhiká.

Vern. :—Gharote (Pb.) ; Guray kheeree, dhoodhee (Sind.) ; Doodhlutta (Beng. and Hind.) ; Khirai (B.) ; Doodee-palla (Tel.) ; Dudhiká (Bomb.) ; Dudhani (Mar.).

Habitat :—Throughout the plains and lower hills of India, from the Punjab to Assam, and Ceylon.

A very slender, climbing, perennial, deciduous herb ; roots fibrous, form the lower nodes. Stems numerous, long, much-branched, slender, quite glabrous. Leaves deciduous, 4-6 by $\frac{1}{2}$ -lin., membranous, lanceolate, linear, rounded at base, tapering to very acute apex, glabrous, thin, pale green, venation pellucid. Petiole $\frac{3}{8}$ in., slender. Flowers pale, cream-colour, veined and stained with purplish streak, large, drooping, lin. or more in diam., on long slender pedicels, which are thickened upwards, cyme from between the petioles, 3 or 5-fid, lax, racemose, long stalked, much exceeding leaves. Bracts minute. Calyx-segments lanceolate, acute, glabrous, thin. Corolla $\frac{3}{4}$ -lin. diam. Lobes rather shallow, ovate, triangular ; column prominent ; filaments very broad. Follicles rather membranous, $2\frac{1}{2}$ in., somewhat falcate, a little inflated, smooth (and often abortive) ; seeds very numerous, broadly ovate, flat, $\frac{1}{8}$ in., carnosé ; coma $\frac{3}{4}$ in. long.

Uses :—A decoction of the plant is used as a gargle in aphthous ulcerations of the mouth and in sore-throat. The milky sap forms a wash for ulcers in Sind. In combination with turpentine it is prescribed for itch (Murray).

Probably on account of the milky juice which it exudes, native practitioners ascribe galactagogue properties to this plant. It has a very bitter taste, and is said to possess marked antiperiodic properties (S. Arjun).

The fresh roots are, in Orissa, held to be a specific for jaundice. (W. W. Hunter).

772. *Calotropis gigantea*, R. Br. H.F.B.I., IV. 17.

Syn. :—*Asclepias gigantea*, Roxb. 25.

Sans :—Arka.

Vern.:—Madár, ák, ág, árka, ákond, ákan (H.); Âkanda, guartákand, swet-ákond (B.); Ahauna (Santal.); Auk (Nepal); Akra, rúi, akandá mândará (Bomb.); Akanda, rui, akda cha jhada (Mar.); Akado, ákdámu jhadá, dhola akdo (Guz.); Bijeloshá (Sind.); Yercum, erukkam, erukku (Tam.); Jilledu, jilleru, nella-jilledu, mandaramu, jilleduchettu, yekka (Tel.); Yekka, ekki-mále, yokada (Kan.); Erukku, yerica, belerica (Mal.); Kádrati (Gond.).

Habitat:—Throughout India, chiefly in waste land.

A middle-sized shrub; young parts covered with appressed white tomentum; bark pale. Leaves subsessile, 4-8 by 1-4 in., obovate or oblong, acute or acuminate, coriaceous, cottony beneath; base cordate, often amplexicaul. Brandis says the flowers are inodorous. They have a faint odour, not at all unpleasant. Flowers downy outside, on pedicels, arranged in axillary or subterminal pedunculate, simple or compound, umbels or corymbs; bud ovoid. Corolla $\frac{1}{2}$ -lin. across, dull-purple or purplish lilac, or white; lobes ovate-lanceolate, spreading. Corona-scales elongated, but truncate at the apex, hairy. Follicle 3-4 in. long, recurved. Seeds ovate, $\frac{1}{4}$ in. long, with a bright, silk-white coma.

Parts used:—The root; bark; leaves and juice.

Uses:—"The root-bark is said to promote the secretions and to be useful in skin diseases, enlargements of the abdominal viscera, intestinal worms, cough, ascites, anasarca, &c. The milky juice is regarded as a drastic purgative and caustic, and is generally used as such in combination with milky juice of *Euphorbia neriifolia*. The flowers are considered digestive, stomachic, tonic and useful in cough, asthma, catarrh and loss of appetite. The leaves, mixed with rock salt, are roasted within closed vessels, so that the fumes may not escape. The ashes thus produced are given with whey in ascites and enlargements of the abdominal viscera. The root-bark, reduced to a paste with sour congee, is applied to elephantiasis of the legs and scrotum. The milky juice of *C. gigantea* and *Euphorbia neriifolia*, are made into tents with the powdered wood of *Berberis asiatica*, for introduction into sinuses and fistula in ano. The milky juice is applied to carious teeth for relief of pain" (Dutt).

By the Mahomedan writers the juice is described as caustic, a purge for phlegm, depilatory, and the most acrid of all milky juices. Medicinally, it is useful in ringworm of the scalp and to destroy piles; mixed with honey, it may be applied to aphthæ of the mouth; a piece of cotton dipped in it may be inserted into a hollow tooth to relieve the pain. Hakim Mir Abdul Hamid strongly recommends it in leprosy, hepatic and splenic enlargements, dropsy and worms. The milk is a favorite application to painful joints, swellings, &c., the fresh leaves also, slightly roasted, are used for the same purpose. Oil, in which the leaves have been boiled, is applied to paralysed parts, a powder of the dried leaves is dusted upon wounds to destroy excessive granulation and promote healthy action.

In want of virility the following prescription is in vogue. Take 125 of the flowers, dry and powder, then mix with one tolâ each of cloves nutmegs, mace and pellitory root, and make into pills of six mâssâs each. One pill may be taken daily dissolved in milk (Dymock).

The root, bark, and juice of this plant are used in medicine for their emetic, diaphoretic, alterative, and purgative properties. In the treatment of dysentery, the dried bark of the root is stated to be an excellent substitute for Ipecacuanha. The bark, root, and dried milky sap may be used in small doses in certain cutaneous affections, such as leprosy and secondary syphilis; the root-bark, in large doses, is an emetic. It is administered to promote secretions, and is stated to be useful in enlargements of the abdominal viscera, intestinal worms, cough, ascites, anasarca, &c. The flowers are considered digestive, stomachic, tonic, useful in asthma, catarrh, and loss of appetite. The powder of the root in 3 to 5 grains promotes gastric secretion and acts as a mild stimulant and may be given with carminatives in dyspepsia. It is also given as a febrifuge.

773. *C. procera*, Br., H.F.B.I., IV. 18.

Sans.:—Alarka.

Vern.:—Spulmei; Spalmak; Pashkand (Trans. Ind.) Ak

(Sind.); Mándára (Mar.); Safed-ak, ak, madâr (Hind.); Vellerku (Tam.); Spalwakka (Afg.).

Habitat:—Western and Central India, from Sindh and the Punjab to Behar and Bombay.

Habit, leaves, and inflorescence as of *C. gigantea*, excepting that the leaves, 8-9 by 4 in., are more gradually narrowed and somewhat less cottony beneath when mature, and the peduncles rather longer. Flowers purplish red, silvery outside, odorous; buds hemispherical. Corolla campanulate, lobes erect. Corona-scales acute, nearly as broad as long, glabrous or pubescent. Follicles as of *C. gigantea*. Both the plants have a white, milky, acid juice and substantial roots.

Rev. A. K. Nairne, in the Flowering Plants of Western India writes:—I never could make out the difference between the two species, as the distinctions given seemed to me to be not only trifling, but also not constant; and Roxburgh knew of only one species. There are also various differences of opinion among the authorities as to the distribution of the two species. One or both of these shrubs has the property of maintaining a very low temperature, Hooker having found the fresh milky juice to be 70°, when the soil surrounding the roots was from 90° to 104° and the exposed leaves 80°, when the surrounding earth was about 105.

Uses:—The medicinal properties of this plant are similar to those of *C. gigantea*. The milky juice is, moreover, used as a blistering agent. The fresh root is used as a tooth-brush, and is considered by Pathâns to cure toothache (Watt).

The flowers believed to have detergent properties. (S. Arjun).

The fresh milk is employed in the Punjab for the purposes of infanticide. In a drachm dose the fresh juice will kill a large drop in 15 minutes; its action, though slower, resembles that of hydrocyanic acid, but commences with foaming at the mouth. (Dr. Aitchison, in Watt's Dictionary).

The flowers are used in cases of cholera (Dr. Thompson, in Watt's Dictionary).

In the Second Report of the Indigenous Drugs Committee, (p. III), it is stated:—

Calotropis procera and *Calotropis gigantea* (tincture used):—Conflicting reports of the action of this drug were received from those who experimented with it. Major Sutherland, Principal of the Lahore Medical College, tried it at the Mayo Hospital and reports that it has not proved of much value

in dysentery. Captain C. Dykes, M. B., Civil Surgeon of Bareilly, reports that with the tincture of the drug in dysentery, his results were "as good but not I think better than those ordinarily obtained in mild cases by the use of sodium and magnesium sulphate." He states that he had no opportunities of comparative trials in unusually severe cases. He is of opinion that in the absence of special advantages over salines owing to the expense of making "Galenical" preparations of *madar* that the use of this is not indicated. It is not understood what special expense is referred to, as there cannot be much expense in making a tincture of this any more than of any other drug. Captain Dykes promises a further report after renewed experiments with crude preparations of the drug which is readily obtainable at Bareilly. The President of this Committee (Colonel G.F.A. Haris, M.D., F.R.C.P.) used this drug extensively at Ali Masjid 1880 where there were very numerous cases of all degrees of severity of dysentery amongst sepoys of the 16th Lucknow Regiment with which Regiment he then was and when all the store of *ipeca-cuanha* had become exhausted. Many notes were kept of cases so treated, and the conclusion arrived at was that in mild cases of dysentery the crude powder of the dried root of the *madar* (which grew abundantly in the Khyber Pass) certainly appeared to do good, and cases got well on it, but that it was certainly not a specific in all cases and had much the same tendency as *Ipecacuanha*, to produce vomiting and depression. The evacuations became bilious after *madar* much the same as they do after *ipeca-cuanha*.

Captain W. M. Anderson in Kurram reports that he found it "useful in mild subacute cases of dysentery, but recovery was slow, and it had little or no effect in severe cases." Dr. F. X. de Attalides, Superintendent of Jail, Katha, was very successful in one case of acute dysentery with *madar* and used 15 m. of the tincture four times daily. He also considered it a "good cholagogue," but it would seem that he is hardly justified in drawing any conclusion either as to its effects in dysentery or as a cholagogue from the results produced in a solitary case.

Again, at page 41 of the Same Report, the following appears :—

Purpose.—To determine the value of *Calotropis* in dysentery in the place of *ipeca-cuanha*. For the purpose two preparations have been made from it, viz., a tincture and a powder. The tincture has been made up according to the recipe of the *British Pharmacopæia*.

Dose :—of the tincture $\frac{1}{2}$ —1 fluid drachm ;
of the powder 5—10 grains.*

Remarks.—The active principle of *Calotropis* has not been accurately determined, but it is believed to be a yellow bitter substance which makes but a very minute percentage of the plant's tissue.

In native Indian medicine the powdered root-bark of *Calotropis* is inconsiderable use. There can be no doubt that it is efficient as a drug, but the question before us is, is it as efficient as *ipeca-cuanha* for dysentery.

* As an alterative the powder may be used in doses of less than 10 grains ; it is an emetic in doses of 30—60 grains.

The following is a resume of the trials reported to the Indigenous Drugs Committee:—

Captain Childe, who used the minimum doses of the tincture, reported that the drug was found useful in acute and subacute dysentery, but that in cases of chronic diarrhoea no good effect was observed. Lieutenant-Colonel Nailer reported that in 30 grains dose the drug acted as an efficient emetic in one case. Captain Waters reported that it was tried in two cases of mild dysentery and appeared to have a slight effect. Captain K. Prasad reported that the powder is a good substitute for ipecacuanha in dysentery and that the tincture is not so efficacious as the powder. Civil Surgeon Maddox reported that an initial dose of 5 grains of the powder first given produced violent vomiting and purging. The pulvis should be given at first in small doses gradually increased. The tincture given in 30 m. doses produced vomiting and purging. In 20 m. doses it however had not that effect, the dose should be gradually increased. Lieutenant-Colonel Bartholomeusz reported that he tried pulvis *C. procera* in two cases, of dysentery, but with no satisfactory results. Major Crawford reported that the drug was tried in several cases where ipecacuanha would otherwise have been administered and the results have not been very satisfactory. Major Macnamara reported that it was tried in a few cases, but no good effects were noticeable. Assistant Surgeon Ganga Singh reported that the tincture and powder of *C. procera* have been used in bronchitis and dysentery and have been found efficacious. Major Powell reported that the tincture has been prescribed as a tonic and stomachic for debility and impaired appetite in five cases in doses of 20 m. with satisfactory results.

Chemical composition.—The authors of the Pharmacographia state, that by following the process of Duncan, 200 grammes of the powdered bark of *C. gigantea* yielded nothing like his mudarine, but 2·4 grammes of an acrid resin soluble in ether and alcohol. The latter solution reddens litmus; the former on evaporation yields the resin as an almost colourless mass. When the aqueous liquid is separated from the crude resin, and much absolute alcohol added, an abundant precipitate of mucilage is obtained, and the liquid now contains a bitter principle, which after due concentration may be separated by means of tannic acid. Similar results were obtained by exhausting the bark of *C. procera* with dilute alcohol. The tannic compound of the bitter principle was mixed with carbonate of lead, dried, and boiled with spirit of wine. This after evaporation furnished an amorphous, very bitter mass, not soluble in water, but readily so in absolute alcohol. The solution is not precipitated by an alcoholic solution of acetate of lead. By purifying the bitter principle with chloroform or ether, it is at last obtained colourless. This bitter matter is probably the active principle of *Calotropis*; we ascertained by means of the usual tests that no alkaloid occurs in the drug. The large juicy stem, especially that of *C. gigantea*, ought to be submitted to an accurate chemical and therapeutical examination, List's *asclepione* (Gmelin's Chemistry XVII., 368.) might then be sought for. (*Op. cit.*, 2nd Ed., p. 426.) Drs. Warden and Waddell (1881) commenced an examination of Madar root bark in Calcutta, and obtained a substance crystallizing in nodular masses,

which they thought would prove to be the *Asclepione* of List (Gmelin's Handb. XVII., 368), but subsequently (1885), upon Warden continuing the investigation of the drug in the Chemical Laboratory of the Gesundheits Amt, Berlin, he found the substance supposed to be *asclepione* to have a composition corresponding with the formula $C^{11}H^{12}O$, whereas List's *asclepione* is represented by the formula $C^{23}H^{34}O^3$.

The white cauliflower masses of crystals obtained in Berlin were found to agree closely, as regards their melting point and behaviour with solvents, with a substance called *Alban* obtained by Payen from gutta-percha (Jahresbericht über die Fortschritte der Chemie, 1852, p. 643), they were accordingly named *Madar-alban*. A yellow resin associated with *madar-alban* in the drug was found to agree, in behaviour with reagents, with the *Fluavil* found by Payen in gutta-percha, but as regards chemical composition the *madar-alban* and *madar-fluavil* differed from the *alban* and *fluavil* of gutta-percha. Dr. Warden also separated from the drug a *yellow bitter resin*, which is probably the active principle, and *Caoutchouc*.

He found the percentage of the various principles (the results being calculated on the bark containing 8.079 per cent. of water) to be—

Madar-alban.....	0.610
Madar-fluavil.....	2.471
Black acid resin.....	0.997
Caoutchouc free from M.-alban and M.-fluavil.....	0.855
Yellow bitter resin (active principle).....	0.098

The fact that the sap of the *Madar* plant contains in addition to *Caoutchouc* two principles analogous to the *alban* and *fluavil* of gutta-percha is a point of some interest, as *madar guttapercha* has been recommended as a substitute for the commercial article. For full particulars of the chemical examination, see *Pharm Journ.*, Aug. 22nd, 1885.

Drs. E. G. Hill and A. P. Sarkar of Muir College, Allahabad, have analysed the root-bark and have published the results in the *Journal Chemical Society* (T. 1915 pp. 1437-1442), of which the following is a summary:—

Four kilos. of the root bark broken up and extd. with boiling 98% alc. for 3 hrs., gave 78 g. oil, 90 g. white solid (A) which sepd. partly on cooling and partly on concn., and a residue which, when extd. with Et_2O and digested with H_2O , gave 330.5 g. gutta-percha-like residue and a small amt. of a yellow bitter principle. A long series of fractional crystns. from alc. of (A), identical with Warden and Waddell's "madaralban" *Pharm J.* 1885, 165, gave, as the less sol. portion, *akundarol isovalerate* (B), $C_{33}H_{61}OCO_2C_4H_9$, needles, m. 210° , $[a]_D^{25}$ 119° in Et_2O , and as the more sol., *mudarol isovalerate* (C), $C_{30}H_{57}OCO_2C_4H_9$, nodules, m. 140° , $[a]_D^{25}$ 128° in Et_2O . Sapon. of (B) gave *akundarol* (D), $C_{33}H_{62}O_2$, needles, m. 215°

(acetate, needles, m. 222°), oxidized by CrO_3 in HOAc to *akundaric acid*, isolated as the silver salt, $\text{C}_{33}\text{H}_{52}\text{O}_5\text{Ag}$, faintly green, amorphous. Sapon. of (C) gave *mudarol* (E), $\text{C}_{30}\text{H}_{48}\text{O}_2$, hexagonal plates, m. 176° (acetate, needles, m. 195–6°), oxidized to *mudaric acid*, amorphous, m. 225°, purified through the silver salt $\text{C}_{30}\text{H}_{45}\text{O}_3\text{Ag}$, faintly green, amorphous. (B), (C), and their alics. gave color reactions very similar to those of cholesterol and phytosterol. A little (D) in 2 cc. CHCl_3 , treated with 20 drops Ac_2O and 1 drop H_2SO_4 , gave the usual violet-pink color, while (E) gave an intense blue. The resinous material evolved NH_3 and amines when boiled with concd. aq. KOH , and was finally purified to a hard, brittle mass of the comp. $\text{C}_{34}\text{H}_{47}\text{O}_{12}\text{N}$. (*Chemical Abstracts*, Jan. 10, 1916 p. 41.)

No crystalline derivative could be isolated from the guttapercha-like substance and no alkaloid could be isolated, although the yellow bitter principle gave the usual alkaloidal reactions.

The following results were obtained from quantitative experiments on the powdered barks :—

			From Young Plants.	From Old Plants.
Moisture	...	...	12.1	10.2
Spirit extract	...	...	15	16.2
Soluble in water	...	...	7.2	7.5
Resins	...	...	7.8	8.7
Total Ash	...	...	7.0	12.2
Sand	...	...	2.8	7.2
Pure Ash	...	...	4.2	5.0

It will be seen that the root-bark from the older plants has a higher percentage of acrid and bitter resinous matters than that from the younger plants. In this connection attention should be drawn to a remark made some years ago by Moodeen Sheriff of Madras. In the Supplement to the *Pharmacopœia of India*, page 364, he reports that he found that the older the plant, the more active is the bark in its effects. (Hooper).

The latex of *C. procera* contains a rennet ferment, which, like those present in the fig, papaw, etc., coagulates boiled milk more rapidly than raw milk and is very resistant to heat. Its action is inhibited by mercuric chloride, but not by salts of the alkali metals. (*J. Ch. S. A.* II. p. 977.)

Calotropis procera.—A new Heart Drug acting like *Digitalis*.—L. Lewin., Berlin. *Arch. exp. Path. Pharm.* 71, 142-56. The physiologically active substance is found in the milky juice of the plant, in which it may be preserved for years without fermentation. The milk coagulates upon long standing or by the addition of alc. or Me_2CO , $D=1062$ reacts alk. The white, resin-like

ppt. becomes hard in the air. After washing with alc. H_2O and Me_2Co , there remains an ash free substance $C_{16}H_{27}O$. The resin-free serum reacts alk; upon heating, the protein is coagulated. With HCl , HNO_3 , picric acid and salts of heavy metals, it gives a turbidity, with $NaOH$ a gelatinous ppt., and with alc. $(N.H_4)_2SO_4$ or $NaCl$ a pptn. of albumose-like protein compounds. The active substance is found in the serum after freeing from resin, protein and sulphates. Upon conc. it appears as a black, resin-like mass, with a smell like coniine which causes headache. It is sol. in H_2O and dil alc., with green fluorescence Et_2O ppts. from alc., a yellow N-free mass, hygroscopic, reacts neutral, color of H_2SO_4 solution is red. The same product is obtained by centrifuging and conc. of the serum and extraction with alc. or $CHCl_3$. The pharmacological action of the juice upon warm or cold-blooded animals is like that of digitalis. O. 02-O. 04. G of the purified principle, injected subcutaneously, kills a rabbit in 30 minutes, a guinea pig in 15 minutes. With pigeons, there results vomiting; in frogs 1-3 mg. causes systolic arrest of heart action in 6 minutes.--Ch. Abs., August 10, 1913, page 2668.

774. *Asclepias curassavica*, Linn. H.F.B.I., IV. 18.

Vern. :—Kuraki; Kákatundi (Bomb.).

Habitat :—Bengal and various parts of India, a weed introduced from the West Indies throughout the Tropics.

Parts used :—The leaves, root and flowers.

Perennial, erect herbs. Leaves opposite, lanceolate, or oblong-lanceolate, acute, narrowed into a short petiole, glabrous. Cymes umbelliform. Umbels many-fid, shortly peduncled. Sepals glandular within. Corolla rotate, lobes reflexed, orange-red. Stamens unite and form a tube round the pistil. Filaments have horn-like appendage, the cucullus which performs functions as a nectary. Follicles turgid, smooth. Seeds comose, numerous.

Uses :—In Jamaica, it is called 'blood-flower,' owing to its efficacy in dysentery. The root is regarded as purgative, and subsequently astringent. It is also a remedy in piles and gonorrhea (Ainslie; Baden-powell, *Panjab Products*).

According to the U. S. Dispensatory, the root and expressed juice are emetic and also cathartic. The juice of the leaves has been strongly recommended as anthelmintic; and, according to Dr. W. Hamilton, it is useful in arresting hæmorrhages and in obstinate gonorrhœa. The medicine is, however, somewhat

uncertain in its operation (U. S. Dispensatory, 15th Edi., p. 1579). Ph. Indica, p. 142.

Dr. Guimaræ found it to act directly upon the organic muscular system, and specially upon the heart and blood-vessels, causing great constriction of the latter and distension of the larger arteries. Secondly, it occasioned great dyspnœa, vomiting and diarrhœa (Dymock).

Dr. Gram (Archiv. f. exp. path. U. Pharm. xix; 384) has found the plant to contain an active principle of a glucosidal character, which he has named asclepiadin, and appears to consider a purer form of the asclepiadin of Harnack and the asclepin of Feneulle. This substance was yellowish, amorphous, and when freshly prepared very soluble in water, but either in solution or in a dry state it quickly decomposed, sugar being separated, and the residual compound becoming in proportion insoluble in water and inert. From an ethereal solution crystals gradually separated out, apparently identical with List's asclepione and quite inactive physiologically.

The physiological action of the unaltered asclepiadin was found to closely resemble that of emetin, but in view of the instability of the compound Dr. Gram doubts whether it can be advantageously introduced into medicine.

Asclepione $C^{10}H^{13}O^*$ was discovered by C. List in the milk Sap of *Asclepias syriaca* (Gmelin Handle 17, 368.) Feneulle separated a resinous substance and a bitter principle (asclepin) from *Asclepias Vincetoxicum*. (J. Pharm. 11, 305.) (Pharmacographia Indica, Vol. II. p. 428).

775. *Pentatropis spiralis*, Dene. H.F.B.I., IV. 19.

Vern.:—Ambarvel, van veri, arkapushpi (Pb.); Singarota (Bomb.); Shigaroti (Guz.).

Habitat:—The Punjab, Sindh, and eastwards to the Jumna river.

A small twining shrub with tuberous roots, almost glabrous. Leaves $\frac{3}{4}$ - $1\frac{1}{2}$ in. long, variable in width, ovate oblong or linear, acute or obtuse; usually mucronate, more or less fleshy, base rounded or cordate, petioles slender, $\frac{1}{10}$ - $\frac{1}{3}$ in. long, puberulous when young. Cymes 3-6-fl'd. Flowers greenish; peduncles short or none, pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in. long, filiform. Calyx minute, deeply divided, puberulous; lobes ovate, acuminate. Corolla $\frac{1}{2}$ in. in diam., divided nearly to the base; segments $\frac{1}{3}$ - $\frac{1}{2}$ in. long, narrowly acuminate, glabrous outside, puberulous within. Corona-scales deltoid-ovate acute or acuminate. Follicles 2-3

in. Seeds $\frac{1}{8}$ in. long, ovate, flat, minutely crenate at the lower end. (Duthie).

Use. :—The flowers are officinal in the Punjab (Stewart).

In Bombay, the dry roots given in decoction are considered astringent (S. Arjun).

776. *Dæmia extensa*, Br. H.F.B.I., IV. 20.

Syn. :—*Asclepias echinata*, Roxb. 256.

Sans. :—Phala Kantaka, in allusion to its echinate follicles.

Vern. :—Utran, jutuk, sagovânee (H.); Trottoo, seealee, kureal (Punj.); Kharyal (Sind.); Chhâgul-bâti (B.); Velipparutti, uttâmani (Tam.); Jittupâku, gurti-chettu (Tel.); Hâlakoratige, Kuntiga; Juttiwe, Talavâranaballi. (Kan.); Utarni (Bomb.); Nâgala dudheli (Guz); Utarani; Utarandi (Mar).

Habitat. :—Throughout India, from the Salt Range and the N.-W. Himalaya to Lower Bengal and Ceylon.

A perennial foetid herb. Stems twining, more or less hispid, with short spreading hair and minute prickles. Leaves 2-4 in., and nearly as broad, deeply cordate at base, with rounded lobes, acute, slightly hairy on both sides, ciliate, thin. Flowers pale-green, in long slender, pubescent pedicels. Cymes at first corymbose, afterwards racemose, peduncles coming off from between the bases of petioles, much longer than leaves. Bracts linear, acute. Sepals lanceolate, acute, slightly ciliate. Corolla nearly $\frac{3}{4}$ in. diam., lobes acute, hairy above, ciliate, concave, spreading. Follicles 2-2 $\frac{1}{2}$ in., reflexed, long-beaked; spines long, soft (Trimen). Seeds $\frac{1}{4}$ in. long, broadly ovate, pubescent, margin quite entire (J. D. Hooker).

Uses. :—In Southern India, a decoction of the leaves is given to children as an anthelmintic; and their juice in asthma, and, combined with lime, in rheumatism (Ainslie).

In Western India, the plant has a general reputation as an expectorant and emetic. In Goa, the juice of the leaves is applied to rheumatic swellings (Dymock).

Dr. Oswald states that it is used as an expectorant in the

treatment of catarrhal affections, in ten grain doses, at the Pettah Hospital, Mysore (Ph. Ind.).

The fresh leaves made into a pulp are used as a stimulating poultice in carbuncle, with good effect (S. Arjun).

Certainly valuable as an emetic with infants: the leaves are washed, and the juice expressed by rubbing between the palms of the hands; the leaves of the dark *Toolsi* are similarly treated, and then a mixture of the juice is given: this preparation is a stimulating emetic. (Dr. Evers).

Used in infantile diarrhœa (Dr. Thompson, in Watt's Dictionary).

Dr. P. S. Mootooswamy notices the use of the juice in rheumatism in combination with ginger. It is used in the preparation of a purgative medicinal oil used in rheumatism, amenorrhœa and dysmenorrhœa, and that the root bark is used as a purgative in rheumatic cases in doses of 1 to 2 drachms mixed with cow's milk. (Ind. Med. Gaz., Feb. 1890).

The leaves like those of tobacco and *Adhatoda*, evolve alkaline fumes when ignited, and like them contain an alkaloid. The alkaloid, which we have provisionally named *Dæmine*, is soluble in ether, alcohol and water and shows no disposition to crystallize from these and other solvents. In contact with strong sulphuric acid it dissolves with a reddish violet colour, gradually fading; with Frohde's reagent it gives a yellowish brown coloration. It forms crystalline deliquescent salts very soluble in water with a bitter taste. An alkaloid having similar properties was separated from a sample of the root. The ash from a sample of the dried and powdered leaves amounted to 15.33 per cent. (Pharmacographia Indica, Vol. II, p. 444.)

777. *Holostemma Rheedii*, Wall. H.F.B.I., IV. 21.

Syn. :—*Asclepias annularis*, Roxb. 253.

Vern. :—Tultuli, sidori, dudurli (Bomb.); Apung (Kol.); Apung, morou-rak (Santal.); Palay kirai (Tam.); Pala kura, pála gurugu, istarakula (Tel.).

Habitat. :—Tropical Himalaya, from Sirmore to Sikkim; Deccan Peninsula, from the Circars and Canara southwards.

A rather large perennial, woody at base. Stems twining, much branched, glabrous, shining. Leaves rather large, 3-5in.,

oblongovate, cordate at base, with rounded lobes, suddenly acute at apex, glabrous above, pubescent on veins beneath, rather thick; venation reticulate, glabrous; bracts minute. Sepals oval, obtuse, glabrous. Follicles (one generally suppressed?) (K. R. K.), 5-6 in., fusiform, oblong, blunt, cylindric, with a deep furrow along each side, fleshy (Trimen).

"Flowers red-purple and white, subglobose." Corolla 1-1½ in. diam., lobes subacute, incurved, white on back and margin.

Uses:—In the Concan, the roots are used as a remedy for scalding in gonorrhœa, and, beaten into a paste, are applied to the eyes in ophthalmia. In diabetes, the root rubbed to a paste is given in cold milk. In spermatorrhœa, the dried root, with an equal quantity of the root of *Eriodendron anfractuosum*, powdered, is given in 6 massa doses, with milk and sugar, twice daily (Dymock).

Rheede first drew attention to the medicinal virtues of the root, mentioning its value as an application for ophthalmia.

It is employed in decoction by the Santals, as a remedy for cough, and also for orchitis (Revd. A. Campbell).

778. *Sarcostemma brevistigma*, W. & A. H.F.B.I., IV. 26.

Syn.:—*Asclepias acida*, Roxb. 251.

Vern.:—Somalatá (H. and B.); Soma (Bomb.); Tigatshumoodoo (Tel.); Thorinjal (Sind.); Ran sher (Mar.).

Habitat:—Deccan Peninsula; not uncommon in dry rocky places.

A trailing, leafless, jointed shrub. Stem as thick as a goose-quill, green, joints 4-6 in. long. Umbels sessile, terminal, 1-1½ in. diam., many-fid. Pedicels ¼ in., puberulous. Flowers pale-greenish white or whitish. Sepals small, ovate. Corolla ¼ in. diam., lobes ovate or oblong. Column very short; corona and column together rounded or obtuse; inner processes of the corona almost concealing the anthers. Stigma very shortly

conical. Follicles 4-5 by $\frac{1}{8}$ in., thinly coriaceous, slightly diverging, narrowed to the base, tip fine, straight. Seeds flattened, $\frac{1}{8}$ - $\frac{1}{4}$ in. long, ovate.

Use:—Water passed through a bundle of *Somalatâ* and a bag of salt, will extirpate white ants from a field watered by it. The ancient Hindus used to prepare an intoxicating liquor from the juice of the plant mixed with barley and *ghee* (Birdwood).

This does not seem to be the soma plant of the Vedas. (B. D. B.).

779. *Gymnema sylvestre*, Br. H.F.B.I., IV. 29.

Syn.:—*Asclepias geminata*, Roxb. 256.

Sans.:—*Mesha-sringi*.

Vern.:—*Mera-singi* (H. and B.); *Gurmar* (H.) *Kâvali*, *wákândi* (Bomb.); *Shiru-kurunja* (Tam.); *Poda-patra*, *putla-podra* (Tel.); *Parpatrah* (Dec.); *Chhota-dudhi-latâ* (B.).

Habitat:—Banda, Dekkan Peninsula, from the Konkan to Travancore; Ceylon, low country.

A stout, woody climber, covering high trees. Branches slender, very numerous, cylindric, softly and shortly hairy. Leaves 1-2 $\frac{1}{2}$ in. or 1 $\frac{1}{4}$ -2 in., rather small, ovate, obovate or elliptic, rounded at base, rarely cordate, acute, shortly acuminate, hairy on the veins, especially beneath. Petiole $\frac{1}{4}$ in., hairy, slender or stout. Cymes $\frac{1}{2}$ in. diam., subglobose, 2-nate, peduncled, nearly flat; pedicels slender. Bracts obsolete, says J. D. Hooker, but says Trimen, probably after examining the plant in the fresh and not dried condition, that the bracts are numerous, minute, hairy. Calyx segments ovoid, rounded or obtuse, hairy. Corolla about $\frac{1}{8}$ in. diam., pale-yellow; lobes about as long as the tube, acute, recurved, coronal scales in the throat of Corolla, fleshy, blunt, produced downwards as double ridges on the tube; Column small; stigma ovoid, prominent. Follicles small (one usually suppressed) 1 $\frac{1}{2}$ -2 in.; slender tapering (Trimen); 2-3 by $\frac{1}{8}$ in., glabrous, terete, rigid (J. D. Hooker). Seeds narrow, $\frac{1}{2}$ in. long, narrowly ovoid-oblong, flat, with a broad thin wing,

pale-brown. The leaves, in Wight's figure, unusually large, says J. D. Hooker.

Uses :—The root is in esteem amongst the Hindus as a local and internal remedy in snake-bites (Ainslie). The root is also said to possess emetic and expectorant properties.

In the Concan, the dried and powdered leaf is used as an errhine (Dymock).

A curious circumstance connected with this plant was first noticed by Mr. Edgeworth; namely, that if chewed, it destroys the power of the tongue to appreciate the state of sugar and all saccharine substances. In his own person he found that powdered sugar, taken immediately after masticating some of the leaves, appeared like so much sand in his mouth, and this effect lasted nearly twenty-four hours, when he recovered the power of distinguishing the taste of sugar (*Pharm. Journ.*, vol. vii., p. 551).

Mr. Hooper repeated the above experiment and states that, after chewing one or two leaves, it was proved undoubtedly that sugar had no taste immediately afterwards. He also further discovered that the leaf had the valuable property of completely removing the bitter taste of sulphate of quinine after a good dose of the leaf, tasting like so much chalk.

Though of opinion that this property might prove of value in pharmacy for the purpose of destroying the taste of quinine, he writes, "I am not going to propose its use in the administration of nauseous drugs, until the properties of the gymnema have been more studied. Otherwise, the quantity of the vehicle taken may be proved to counteract the effect of the medicines."

The leaves contain no cyanogenetic glucoside. On igniting the air-dried leaves, 8.6 per cent of ash was obtained, which yielded the following results on analysis : CaO, 19.3 per cent. ; Fe_2O_3 and Al_2O_3 17.9 per cent. ; MgO, 2.7 per cent. ; the remainder consisted chiefly of alkali carbonates, with traces of manganese and silica.

On adding water to an alcoholic extract of the leaves, a soft, dark-green, resinous mass was obtained which contained formic and butyric acids and hentriacontane, melting at 68° and present in the leaves to the extent of about 0.05 per cent. When sulphuric acid was added to the filtrate from this

precipitate, a dark-coloured resinous product was obtained. This substance, which was termed by Hooper "gymnemic acid," is a complex mixture, from which ethyl acetate extracts a portion possessing the property of temporarily destroying the sense of taste for sweet substances; this latter product, for which it is proposed to reserve the name "gymnemic acid," although there is no evidence that it is a homogeneous substance, amounts to about 6 per cent. of the air-dried leaves. It has weak acidic properties and, when fused with potassium hydroxide, yields acetic acid and a molecular compound of proto-catechuic and *p*-hydroxybenzoic acids which melts at 192°; on oxidation with potassium permanganate, formic acid is produced. The resinous substance associated with the gymnemic acid in the precipitate obtained with sulphuric acid is also of an acidic nature, and yields the same products on fusion with potassium hydroxide. The liquid from which the above substances had been separated was found to contain *l*-quercitol, together with *d*-dextrose. The fruits of *gymnema sylvestre* contain the same substances as the leaves, with the exception of *l*-quercitol.

Gymnemic acid and the resinous substance insoluble in ethyl acetate are devoid of toxic properties.—(Fred. B. Power and Frank Tutin, *Pharm. J.* 1904.) *J. Ch. S.* Vol. LXXXVI., pp. 763-764.

780. *Marsdenia Roylei*, Wight, H.F.B.I., IV. 35.

Vern.:—Pathor (Chenab); Tar, veri (Salt Range); Kurang (Simla); Murkula (Hind.).

Habitat:—Eastern and Western Himalaya, from Simla to Kumaon and Sikkim.

A twining shrub. Young parts soft tomentose. Branches, petioles, leaves beneath and cymes finely pubescent or tomentose. Leaves 3-6 by 2-4 in., often velvety beneath, ovate, cordate, acuminate; base usually deeply cordate. Cymes 11½ in. diam., corymbose. Calyx hairy outside. Corolla ¼-½ in. diam., lobes pubescent without, villous within, coronal scales slender, subulate, far exceeding the short anther-tips. Stigma dome-shaped. Follicles turgid, 3 in. long, 1 to 1½ in. broad, with a beak-like tip, straight; pericarp thick, transversely rugose, puberulous. Seeds ½ in. long.

Uses:—The unripe fruit is powdered and given as a cooling medicine (Stewart). A decoction is used as a remedy in gonorrhœa.

781. *Tylophora fasciculata*, Ham., H.F.B.I., IV. 40.

Vern.:—Bhui-dori (Bomb.).

Habitat :—South Nepal ; at Sukanagur ; South Concan and the Bababoodan hills.

Twining perennial herbs. Stems several from the root, erect 12-18 in., nearly simple, flexuous or climbing amongst grass, pubescent. Branches glabrous below, finely puberulous above. Leaves small, 1-1½ in., rather crowded, ovate or oblong-lanceolate, rounded or acute at base, acute, glabrous above, pubescent on veins beneath, coriaceous. J. D. Hooker says, "leaves 1-2 by ¾-1½ in." Petiole ¼ in., slender, pubescent. Flowers small, on rather long, slender, pubescent pedicels. Cymes racemose, shorter than leaves, shortly stalked, erect ; bracts filiform. Sepals linear-lanceolate, acute, coronal processes globose. Follicles fusiform, short, turgid. "1½-2 by ½-¾ in., ovoid-lanceolate ; paricarp very thick, glabrous. Seeds ¼ in. long, broadly ovoid, quite flat." "Pollen-masses horizontal, according to Wight, but "I think erect," says J. D. Hooker.

Uses :—In the Southern Concan, it is used as a poison for rats and other vermin. Dr. Lyon records a case in which it proved fatal to a man (1879). As this plant has very active properties, its physiological effects should be investigated (Dymock).

The juice of the root is given with milk as a tonic ; the leaves are pounded and used as an application to unhealthy ulcers and wounds to induce healthy granulation (*Pharmacographia Indica*, Vol. II. p. 441).

The leaves were very mucilaginous when treated with water, and even the alcoholic extract when evaporated to dryness made a thick solution with a large quantity of water. The latter solution was precipitated by alkaloidal reagents and was most acrid to the taste. Shaken with ether a resinous body was removed, and then made alkaline with ammonia, which produced a slight precipitate, and again shaken with ether, a small quantity of an amorphous alkaloid was separated, which gave a yellowish brown colour with sulphuric acid, passing to a red. The leaves gave off slightly alkaline fumes when ignited, and left 12 per cent. of ash.

The roots reduced to fine powder were made into a tincture with strong spirit, and the evaporated tincture when treated with water left some resinous matter undissolved. The solution shaken with ether yielded up some more resinous substance which became encrusted with feathery crystals when the solvent had been dissipated. A larger quantity of alkaloid was present

in the root than in the leaves, but it appeared to possess similar characters. It was amorphous, but formed a slightly crystalline hydrochloride. The damp crystals of the hydrochloride brought into contact with the fumes from a drop of nitric acid produced a bluish green coloration. With sulphuric acid the alkaloid was first coloured reddish-brown, passing to carmine and then to purple. It was precipitated from solution by the usual reagents.

The alcoholic extract was emetic and purgative. A quantity from 2 grams of the leaves mixed with bread and given to a chicken produced frequent and watery stools. The aqueous extract from the leaves, after removal of all that was soluble by means of alcohol, had no effect upon a guinea-pig.

(Pharmacographia Indica Vol. II pp. 441-442).

782. *T. asthmatica*, W. & A., H.F.B.I., IV. 44.

Syn.:—*Asclepias asthmatica*, Willd. Roxb. 252.

Vern.:—Jangli-pikwan, Antamul* (H.); Antomul (B.); Pitkari; Kharaki-rásna (Bomb.); Nach-churuppán, nay-palai, peyp-palai (Tam.); Verri-pala; Kukka-pála (Tel.); Valli-pála (Mal.); Mendi (Uriya); Pita-kári (Mar.). Adumuttada (Kan).

Habitat.:—N. & E. Bengal, Assam, Cachar, Chittagong; Deccan Peninsula.

A perennial herb. Roots many, long, fleshy. Stems slender, very long, slightly branched, strongly twining pubescent or hairy; or glabrous. Leaves 2-4in., rather thickly coriaceous, very variable in width, rarely pubescent or tomentose on both surfaces, ovate, rounded or oblong, apiculate, acute or acuminate, base usually cordate; nerves few, spreading; petiole $\frac{1}{3}$ - $\frac{2}{3}$ in. Cymes always more or less pubescent, hispid at the base of the umbels. Peduncles shorter than the leaves, bearing 2-3 sessile few-or many-fid umbels, pedicels long, capillary. Sepals long, lanceolate, hispid. Corolla large, $\frac{1}{2}$ in. diam. Lobes short, acute. Flowers dull-yellow and purple within. Coronal processes gibbous or globose, with free cuspidate tips. Follicles very variable, poniard-shaped, divaricate or deflexed 3-4in.; slender in the Dekkan specimens, with a thin pericarp; slender, fusiform, glabrous, in the Ceylon specimens. Seeds $\frac{1}{4}$ - $\frac{1}{2}$ in. long, broadly ovate, coma $\frac{3}{4}$ in.

*The Hindi name is derived from *ant*, 'the entrails,' and *mul* 'a root.' The expression *ant girna* signifies "to suffer from dysenteric symptoms," literally "to void the intestines." (Pharmacographia Indica, Vol. II, p. 437).

Uses :—The dried leaves are emetic, diaphoratic and expectorant, useful in over-loaded states of the stomach and other cases requiring the use of emetics. It has also been found useful in dysentery, catarrh, and other affections in which Ipecacuanha has been employed (*Pharm. Ind.*) Roxburgh, in his *Flora Indica*, gives a long account of the use of this plant as a substitute for Ipecacuanha :—

“On the coast of Coromandel, the roots of this plant have often been used as a substitute for Ipecacuanha. I have often prescribed it myself, and always found it answer as well as I could expect Ipecacuanha to do. I have also often had very favorable reports of its effects from others. It was a very useful medicine with our Europeans who were unfortunately prisoners with Hydar Ally, during the war of 1780, 1781, 1782, and 1783. In a pretty large dose, it answered as an emetic; in smaller doses, often repeated, as a cathartic, and in both ways, very effectually.

“I had made and noted down many observations of its uses, when in large practice in the General Hospital at Madras in 1776, 1777, and 1778, but lost them, with all my other papers, by the storm and inundation at and near Coringa in May 1787. I cannot therefore be so full on the virtues of this valuable, though much neglected, root, as I could wish. I have no doubt but it would answer every purpose of Ipecacuanha.

“The natives also employ it as an emetic; the bark, of about three or four inches, of the fresh root, they rub upon a stone, and mix with a little water for a dose; it generally purges at the same time.”

NOTE BY DR. P. RUSSELL.

“Dr. Russell was informed by the Physician General at Madras (Dr. J. Anderson) that he had many years before known it used, both by the European and Native Troops, with great success in the dysentery which happened at that time to be epidemic in the camp. The store of Ipecacuanha had, it seems, been wholly expended, and Dr. Anderson, finding the practice

of the black doctors much more successful than his own, acknowledged, with his usual candour, that he was not ashamed to take instruction from them, which he pursued with good success; and collecting a quantity of the plant which they pointed out to him, he sent a large package of the roots to Madras. It is certainly an article of the Hindu Materia Medica highly deserving attention."

"In the Concan, 1 to 2 tolas of the juice are given as an emetic; it is also dried and made into pills which are administered in dysentery" (Dymock).

[The root of this plant, which is met with in the bazaars in the form of thick contorted pieces of a pale colour, and a bitterish, somewhat nauseous, taste, has long been known to possess diaphoretic and emetic properties, and its efficacy in dysentery is asserted by Dr. J. Anderson (Roxburgh, *Flor. Ind.*, vol. ii, p. 34). Its value has also been confirmed by Sir W. O'Shaughnessy. It has, however, been superseded by the dried leaves, the operation of which has been found more uniform and certain. It may be regarded as one of the best indigenous (Indian) substitutes for Ipecacuanha.]

Dr. Bidie considers that, like Ipecacuanha and Tartar Emetic, it acts as a specific emetic, exciting vomiting after absorption, by its action on the vagus.

A concentrated infusion of the leaves has a slightly acrid taste. It is abundantly precipitated by tannic acid by neutral acetate of lead or caustic potash, and is turned greenish-black by perchloride of iron. Broughton of Ootacamund obtained from a large quantity of leaves a small amount of crystals—insufficient for analysis. Dissolved and injected into a small dog they occasioned purging and vomiting.

A re-examination of the drug by one of us (D. H.) shows that both the leaves and root contained an alkaloid, Tylophorine, which is crystalline and forms a crystalline hydrochlorate. The solution of the alkaloid is precipitated by tannin, iodine in potassium iodide, potassio-mercuric iodide, perchloride of mercury, picric acid, volatile and fixed alkalies. The alkaloid in a free state is very soluble in ether and alcohol, but only partially in water. With sulphuric acid it dissolves with a reddish colour changing to green and indigo. With HNO_3 it dissolves with a purplish red colour.

Froehde's reagent gives a deep sap-green solution. Sulphuric acid and $\text{K}_2\text{Cr}_2\text{O}_7$ a dirty violet. The leaves afford 15 per cent. of mineral matter.

(*Pharmacographia Indica*, Vol. II, pp. 439-440.)

783. *Cosmostigma racemosum*, Wight., H.F.B.I.,
IV. 46.

Vern.:—Ghárahuvon (Can.); Shendvel, Shendori, Márvel, Márvivel (Mar.); Vattu-valli (Mal.); Ghárphul (Goa).

Habitat:—The Western Ghats, from the Konkan southward. Sylhet. Chittagong. Ceylon, low country, rather common.

A shrubby climber. Stems stout, cylindrical, often lenticillate, glabrous. Leaves 3-5 in., ovate, cordate, or rounded at base, acuminate, subacute, glabrous pedicels; cymes at first umbellate or corymbose, but lengthening out into racemes 2-2½ in. long; no bracts. Sepals oval, obtuse, ciliolate. Corolla greenish-yellow, speckled with red dots; about 1 in. diam., lobes ovate obtuse. Follicles 2½-3 in. Seeds ¾ in., broadly ovate (Trimen). "Corolla ½ in. diam., fleshy, speckled with brown. Follicles 7 in. long by 1½ in. diam., lanceolate or linear-oblong, obtuse, smooth" (J. D. Hooker).

Uses:—This large woody climber, running over high trees, has a medicinal reputation on the Western Coast, where its leaves are used to cure ulcerous sores, Ghâra (घाढ) and the root-bark is administered internally in Vataka (वटक) a disease in which white lumps of undigested food are passed. Useful in dyspepsia accompanied by a febrile condition and absence of bile in the stools. The authors of the Pharmacographia Indica have tried the root-bark of this plant in such cases, given in five grain doses, three times a day, and have found it to be a most efficient cholagogue; it had no purgative effect, but restored the natural colour of the stools after the usual remedies (mineral acids, podophyllin, enonyrium, etc.) had been abandoned in despair. The flowers of this plant are sweet and eaten by the natives. A biscuit was made with the powder of two ounces of the root and given to a dog without any ill effects (Pharmacographia Indica, Vol. II., p. 449.)

An ether extract of the powdered root contained some free crystalline fatty acids, soluble in cold rectified spirit and aqueous alkalies. Petroleum ether dissolved the fatty acids from the extracts, leaving a small quantity of an acid resin. An alcoholic extract, in addition to a resin, contained a sugar,

and a substance affording the re-actions of an alkaloid. The resin is decomposed by boiling with dilute acids, and gives a purplish colour with strong sulphuric acid. It is glucosidal and is related to Jalapin. An aqueous extract contained gum and a carbohydrate having the properties of dextrin. The root was devoid of astringency. The powder mixed with milk of lime gave off ammonia. The larger roots left 3-16 per cent., the smaller ones 5-86 per cent., of inorganic matter on incineration. (*Pharmacographia Indica*, Vol. II, p. 450)

784. *Dregea volubilis*, Benth., H.F.B.I., IV. 46.

Syn.:—*Asclepias volubilis*, Linn. f. Roxb. 253.

Vern.:—Nak-chhikni (Hind.); Tita-kunga (Beng.); Hiran-dodi; Ambri. (Mar.); Kodie-palay (Tam.); Marangkongat (Santal.); Âmbri; Dudhi (Bomb.); Dudi-palla (Tel.).

Habitat.:—Bengal, Assam and the Deccan Peninsula, from the Concan southwards.

A stout, glabrous, hoary or mealy climber, with a woody stem; branches stiff, often pustular; innovations generally hoary, tomentose. Leaves ovate, suborbicular or cordate acuminate, 3-6 by 2-4 in., rather coriaceous, base sometimes rounded, truncate or cuneate, usually tomentose beneath, when young. Main lateral nerves up to 5 pair. Petiole rather stout, 1-3 in.; peduncles 1-3 in., rather slender, drooping. Cymes axillary or interpetiolar, umbelliform; pedicels $\frac{1}{2}$ -1 $\frac{1}{2}$ in., rusty, scaberulous. Flowers green $\frac{1}{3}$ - $\frac{1}{2}$ in. diam. Calyx about $\frac{1}{10}$ in. across, stellate. Sepals triangular, ovate. Corolla dark-green, cup-shaped; lobes broadly triangular, overlapping to the right, $\frac{1}{2}$ in. diam. Coronal scales 5, fleshy, hemispherical, adnate to the very short column, spreading, inner angle cuspidate; pollen-masses wavy. Stigma dome-shaped. Follicles usually double, 3-4 by 1-1 $\frac{1}{2}$ in., broadly lanceolate, turgid, longitudinally ribbed, velvety until mature, afterwards minutely tomentose. Seeds $\frac{1}{3}$ - $\frac{2}{5}$ in. long, says Kanjilal, broad-elliptic, concave, smooth, shining, with sharp edges; coma of very fine, white, silky hairs, about 1 $\frac{1}{2}$ in. long.

Parts used.:—The leaves; roots and tender stalks.

Uses.:—The leaves are much employed as an application to boils and abscesses. The roots and tender stalks are considered emetic and expectarant. (Ph. Ind.).

The Vytians suppose the root and tender stalks to possess virtues in dropsical cases; they sicken and excite expectoration, (Ainslie).

The plant is used in colds and eyes diseases to cause sneezing, whence the Hindi name Nakchikni. This property of the plant is also known in Madras, where the young shoots are cut and the exuding juice is inserted into the nose. (Pharmacographia Ind. II, 445).

The fresh follicles, freed from seeds and their comose appendages, were bruised in a mortar and the juice expressed. The juice was heated to boiling to coagulate albuminous matters and filtered, and the liquor after evaporation to a small bulk, was treated with two volumes of spirit to remove mucilage and salts. After dissipating the spirit by a gentle heat the acidulous solution had a bitterish taste, was free from Tannic matters and contained an abundance of glucose. It was shaken with ether and the ethereal solution left a mass of light coloured transparent scales, soluble in water with a peculiar bittesish-sweet taste and neutral or slightly acid reaction. This solution gave an abundant white precipitate with tannin, none with neutral plumbic acetate and with alkaloidal reagents, such as potassio-mercuric iodide and Iodine in potassium iodide only if previously acidified. With strong aqueous alkali a precipitate without colour, was obtained. With sulphuric acid the dried scales dissolved with a brown colour, passing through cherry-red to purple, and finally separated as a black powder. With Nitric acid no colour was manifested in the cold. Boiling with diluted acid destroyed the bitterness of the principle with the formation of an insoluble brown substance, such as would attend the decomposition of a glucoside. We consider this glucoside to be the active principle of the fruits and propose to name it Dregein, [Pharmacographia Indica, Vol. II. pp. 445-446].

785. *Ceropegia bulbosa*, Roxb. H.F.B.I., IV. 67.

N.B.—The *Flora of British India* notices the following varieties of this plant, viz., 1. *bulbosa* proper, 2. *Lushii*; 3. *esculenta*.

Vern.:—Mánchi, Manda (Tel., Tam.), Gálot (Punj.); Khaparkadu, Gáyala (Mar.).

Habitat:—From Western India, the Punjab and upper Ganges plains as far East as Allahabad, southward to Travancore.

A twining herb. Root tuberous. Stems very slender. Leaves excessively variable, fleshy. In some varieties, the leaves are petioled 1-2in., rarely more, orbicular oblong-elliptic or obcordate,

acute or apiculate, rarely elliptic-lanceolate; base acute, rounded or cordate. In some varieties, the leaves are subsessile, very narrowly linear, 4-8 by $\frac{1}{8}$ - $\frac{1}{2}$ in. In a third variety, the leaves are 4-5 by lin., shortly petioled, linear-lanceolate. Peduncle $\frac{1}{2}$ -lin., 3-5fid. Pedicels short. Calyx minute; sepals $\frac{1}{10}$ in. long. Corolla small, straight, rarely lin. long, narrow, greenish, base moderately inflated, mouth obtusely 5-angled; lobes short, narrow, erect, fleshy, linear from a triangular base, villous within; $\frac{1}{3}$ $\frac{1}{2}$ the length of the tube, purple within. Corona glabrous, lobes minute, or obsolete; processes filiform, straight. Follicles 4 in. long, slender, terete; pericarp thin. Seeds $\frac{1}{2}$ in. long, linear oblong, wing membranous.

The part used:—The tubers.

Use:—The tubers of this and several other species of *Ceropegia* are used and considered to be tonic and digestive. The authors of the *Pharmacographia Indica* (Vol. II., p. 456) write:—"The tubers when boiled lose their bitterness, and pulped with milk form a sweet mucilaginous mixture not unlike Salep, which, judging from their chemical composition, should be highly nutritious."

The drug is used in Behar in colds and eye-diseases to cause sneezing; dose: gr. 1 to $\frac{1}{2}$ dram. (Irvine).

The tubers yielded on analysis—

Moisture	...	...	...	...	5.25
Fat	...	...	...	...	3.30
Sugar, Gum, &c	...	...	...	...	23.40
Albuminoids	...	...	...	...	3.48
Starch	...	...	...	...	42.52
Crude fibre	...	...	...	...	12.64
Ash	...	...	...	...	9.43

100.00

The bitter principle of the tubers is an Alkaloid, *Ceropegine*, soluble in ether, Alcohol and water. The total nitrogen afforded by burning with soda lime was 0.55 per cent. The ash contains Manganese, and is constituted as follows:—

Soluble in water	...	...	...	...	61.7
Soluble in Acid	...	...	...	...	14.9
Insoluble	...	...	...	...	23.4

100.0

[*Pharmacographia Indica*, Vol. II—p. 457.]

786. *C. tuberosa*, Roxb. H.F.B.I., IV. 70.

Syn.:—*C. acuminata*, Roxb. 251.

Vern.:—Kappe-kadu (Bomb.); Pátál-tumbdi (Mar.); Com-múmadu (Tel.).

Habitat:—Deccan Peninsula, from the Concan southwards.

Twining herbs, quite glabrous; root tuberous. Stem leafy slender. Leaves glabrous, 1-4 in.; fleshy, from orbicular apiculate to lanceolate acuminate; base acute or rounded. Petiole $\frac{1}{4}$ - $\frac{2}{3}$ in. Peduncles glabrous 1-3 together, $\frac{1}{2}$ -3 in.; pedicels fascicled or subpaniculate; bracts minute. Flowers 1 in. long and upwards, rarely less. Sepals subulate, $\frac{1}{8}$ in., recurved. Corolla 1-2 in., straight, base somewhat inflate, mouth slightly dilated. Lobes $\frac{1}{3}$ shorter than the tube, suddenly contracted from a triangular base into linear cohering appendages that are at first connate throughout their length, and villous within. Coronal-lobes ciliate, very short. Follicles 4-5 in. long, slender. Seeds $\frac{1}{4}$ in. long, linear.

Use:—The starchy, somewhat bitter tubers, are used as a nutritive tonic in the bowel complaints of children (Dymock).

787. *Boucerosia aucheriana*, Dcne. H.F.B.I., IV. 78.

Vern.:—Charúngli, chungi, pawanne, pamanke (Pb.).

Habitat:—Dry hills in the Western Punjab; the Salt Range, &c.

The genus *Boucerosia* is described by J. D. Hooker as "fleshy leafless herbs, with thick 4-angled stem, angles toothed."

B. Aucheriana is a plant 2-6 in. high; branches $\frac{1}{2}$ - $\frac{1}{2}$ in. diam. Flowers capitate. Sepals ovate-lanceolate. Corolla $\frac{1}{2}$ in. diam., dark-purple, more or less deeply divided into lobes, narrow, lanceolate, glabrous, pustular above. Follicles 3-4 in., tips capitate.

Uses:—The juicy stems are considered stomachic, carminative, and tonic. Bellew states that they are also used as vermifuge, and Masson mentions that, dried and powdered, they are taken as stimulants (Stewart). It is also used as a febrifuge.

N. O. LOGANIACEÆ.

788. *Strychnos colubrina*, Linn., H.F.B.I., IV. 86; Roxb 194.

Vern. :—Kuchila-latâ (H. and B.); Goagari-lakri (Bomb.); Kajar-wel (Mar.); Nágamushti, konsu kandira, tansu-paum (Tel.); Modira-caniram (Mal.); Kanal, taral (Bomb.).

N.B.—These vernacular names are applied to several species of *strychnos*, e.g. *S. Rheedei*, *S. Beddomei*, *S. laurina*, *S. cinnamanifolia*, &c. All of these plants are put to the same uses as *S. colubrina*.

Habitat :—W. Deccan Peninsula, from the Concan to Cochin, frequent.

A scandent shrub, with tendrils often in pair. Leaves 4 by 1½ in., elliptic acute, 3-nerved, glabrous, base cuneate or obtuse; nerves not impressed above, margin pair obscure. Petiole ¼ in. Cymes 1-2 in., axillary, small, compound, puberulous, pedicels 0-½ in. Calyx puberulous. Corolla 1½ in., tube hardly longer than the Calyx, lobes 5, villous within. Anther-cells oblong, glabrous, or nearly so. Ovary glabrous below, fulvous, hairy upwards. Style as long as the ovary. Berry ⅔ in. diam., crustaceous, 1-2-seeded. Seeds ½ in. diam., discoid (C. B. Clarke).

Parts used :—The root, wood, leaves and fruit.

Uses :—The wood of the root is esteemed by the Telinga physicians an infallible remedy for the bite of the *Nâga*, as well as for that of every other venomous snake. It is applied externally, and at the same time given internally. It is also given in substance for the cure of intermittent fevers (Roxb.).

In the Concan, the fresh leaves, rubbed into a paste with the kernel of the cashew nut, are applied to suppurating tumors (Dymock).

The bruised fruit is applied to the head in mania, the root rubbed down with pepper is given to check diarrhœa, and boiled with oil it is used as a liniment for pains in the joints (Rheede).

Rumphius states that it is used in Java as a febrifuge and anthelmintic and also externally in certain skin diseases.

Horsfield notices its use in cutaneous affections, and to alleviate the pain and swelling from confluent small-pox (Dymock).

Its claims as an antiperiodic have been examined by Dr. Berdenis Van Berkelow (*Schmidt's Jahrbucher*, May 24th, 1866, and *Brit. and For. Med. Chir. Rev.*, April 1867, p. 527); and after a trial with it in twenty-two cases, quartan and tertian, he reports favorably of its action, and considers that from its cheapness it may advantageously be used as a febrifuge in pauper practice. The fact of its containing strychnia in considerable quantities indicates the necessity for great caution in its use. Whatever efficacy it possesses in this character is doubtless due to this alkaloid; and as the proportion in which it exists in this wood is undetermined, and is likely to vary according to the season of collection, it is far safer to employ in its stead the alkaloid itself, a preparation of uniform strength, and which can be regulated with comparative ease. In the present state of our information, *Lignum Colubrinum* must be looked upon as a dangerous remedy (*Ph. Ind.*).

789. *S. Nux-vomica*, Linn. H.F.B.I., IV. 90; *Roxb.* 193.

Sans. :—Kupilu; Kulaka.

Vern. :—Kuchlá (H.); Kuchila (B.); Kuchlah (Dec.); Ettik-kottai (Tam.); Mushti-vittulu (Tel.); Kanni-rak-kuru (Mal.); Kájrá (Bomb.); Mushti-bijá (Kan.).

Habitat :—Throughout tropical India; rare in Bengal, common in Madras.

A large, deciduous tree, attaining 40ft., with a straight thick trunk. Root thick, with a yellowish spidermis. Bark thin, dark-grey or yellowish-grey, smooth. Wood white when fresh cut, turning yellowish-grey on exposure, hard, close-grained, durable. No heartwood (Gamble). Leaves broadly elliptic or ovate, opposite, entire, shining, coriaceous, 3-6in. long, 3-5-nerved, glabrous; base obtuse, arising from stout nodes. Petiole $1\frac{1}{2}$ in. long, deeply-grooved. Flowers greenish white, many, small, appearing with young leaves, on short slender pedicels; collected on a small terminal pubescent corymbose cymes, 1-2in. diam., at

the end of branchlets or on axillary shoots, pentamerous, bisexual. "The Strychnine tree is handsome, and when in flower is at once recognized by the strong odour of turmeric which the flower gives off (Gamble). Peduncle $\frac{1}{2}$ -2in. Calyx 5-parted, persistent, $\frac{1}{4}$ - $\frac{1}{2}$ the size of Corolla; lobes acute. Corolla valvate, hypogynous, regular, tubular, or funnel-shaped, with a 5-lobed, reflexed, short limb. Tube $\frac{1}{4}$ - $\frac{1}{2}$ in. long; glabrous at the throat, lobes valvate, about $\frac{1}{8}$ in. long, glabrous, a few conical hairs down the tube, Stamens 5, epipetalous in the throat of the Corolla-tube, alternating with the Corolla-segments. Ovary free, 2-celled, style filiform, glabrous, as long as the Corolla-tube. Stigma 2-lobed. Fruit a berry, globose, smooth, indehiscent, orange-sized, orange-coloured when mature, rind shell-like; full of a soft, white, intensely bitter, jelly-like pulp, with 2-5 seeds immersed in it. Seeds $\frac{1}{2}$ in. diam., circular, discoid, shining, light-silvery grey, silky, having one surface convex, the other concave, with a small foveola in the centre of each side.

Mr. James Small communicated to the Pharmaceutical Society of great Britain at an evening meeting in London, on Tuesday, April 8th, 1913, the following important note on False Nux-Vomica seed.

"A new kind of nux-vomica seed was recently sent over from Burma and offered to manufacturers, but on examination it was found to contain no strychnine. The seed is of a light grey colour externally and yellow internally. The yellow endosperm is much lighter in colour than that of *Strychnos Nux-vomica*, which is usually dark grey and more translucent. The outer surface is densely covered with closely appressed hairs. The seed is flattened, round, or elliptical, and has a ridge around the edge where the two disc-shaped masses of endosperm meet. There is no trace of bitterness in the taste, which in itself is good proof of the total absence of strychnine.

Transverse radial sections of the seed were cut and examined. The three tissues present are the endosperm, the layer of collapsed parenchyma, and the hairs. The internal mass of endosperm is almost identical with that of *Strychnos Nux-vomica*. The outermost layer, shows a slight difference. In the genuine nux-vomica seed the cells of this layer have frequently more or less triangular ends, while in the false seed these cells are more usually square-ended. These cells vary somewhat and square ends occur rather too frequently in the genuine seed to permit of any diagnostic value being attached to this character. The layer of parenchyma, is the same in both seeds. The bases of the hairs, are practically identical, but the angle which the rest of the hair makes with the hair base is slightly

larger in the false than in the genuine seed. The longitudinal, rod-like thickenings, which form the wall of the hair in each case, show a slight difference. In the genuine seed these thickened parts usually remain coherent at the tip of the hair, but in the false they frequently separate and show a slight curvature at the extreme end. These insignificant differences, of course, are of no value in the examination of the powdered drug, and if the seed is entire it is easily distinguished by its lighter colour and the ridge round the edge, as well as the complete lack of any bitter taste. Since there is no significant difference in microscopic characters, a short series of experiments was made to try to find a chemical test whereby the false seed could be detected. Since it was required to distinguish the false seed, the positive tests for strychnine were, of course, valueless, since a mixed powder would give these reactions. Transverse sections were cut and examined under a simple lens and also under the microscope while being treated with various reagents. The reagents used included strong nitric acid, a mixture of strong nitric and sulphuric acids, 50 per cent. sulphuric acids, 50 per cent. sulphuric acids with potassium dichromate, potassium hydroxide solution, B. P. strong solution of iron perchloride, and solution of iodine and potassium iodide. No difference was observed in the reactions of the two seeds with these reagents.

As the published accounts of the genus *Strychnos* give very meagre details with regard to the seeds, it has not yet been possible to assign the false seed to its species, although its structural identity with that of *Strychnos Nuxvomica* leaves no doubt that it is a species of *Strychnos*."

Uses :—According to the authors of the *Pharmacographia Indica* (Vol. II p. 459), "no mention of Nux-Vomica can be found in the older Sanskrit medical works. ++ We can hardly suppose that a plant having such marked poisonous properties can have escaped the notice of the earliest settlers in India, and there can be no doubt that the wood has been in use from a very early date as one of the kinds of Mushadi in Southern and Western India. We also find that in the Indian Archipelago, which was colonised at a very early date by the Hindus, the wood is used as a popular remedy for dysentery, fevers, and Dyspepsia." "Nux Vomica seeds produce a sort of intoxication, for which they are habitually taken by some natives as an aphrodisiac. Those who do so gradually become so far accustomed to this poison that they often come to one seed daily, which is cut into small pieces and chewed with a packet of betel leaf. Medicinally, the seeds are used in dyspepsia and diseases of the nervous system" (*Hindu Mat. Med.*) The author of *Makhzan-ul-Adwiyā* recommends great caution with regard to the medicinal use of Nux Vomica, and says that it is very useful

in palsy, relaxation of the muscles and tendons, debility and chronic rheumatism. It may be applied externally and given internally, in doses of from 1 to 2 dangs (Dymock). The *Pharmacopœia Indica* describes the seed as a valuable nervine tonic and stimulant, and, in overdoses, a virulent poison, and recommends its use in paralytic and neuralgic affections in atonic diarrhœa and chronic dysentery, also in habitual constipation, prolapsus of the rectum, spermatorrhœa, &c. It has also been employed in intermittent fevers, epilepsy, diabetes, anæmia, chlorosis and other affections. The bitter taste and highly poisonous action of this substance are chiefly due to the presence of strychnine and brucine, the proportion of the former varying from $\frac{1}{4}$ to $\frac{1}{2}$ per cent.

In the Concan, small doses of the seeds are given with aromatics in colic, and the juice of the fresh wood (obtained by applying heat to the middle of a straight stick, to both ends of which a small pot has been tied) is given in doses of a few drops in cholera and acute dysentery. In some districts small quantities of the seeds are taken, apparently as a stimulant, or in lieu of opium. (Dymock).

"The leaves when applied as poultice, promote healthy action in sloughing wounds or ulcers, more especially in those cases when maggots have formed. It arrests any further formation of them, and those in the deeper parts perish immediately when the poultice is applied. The root-bark is ground up into a fine paste with lime-juice, and made into pills which are said to be effectual in cholera" (Dr. Thompson, in Watt's Dictionary).

An oil from the seeds is employed medicinally.

"I have found strychnine, very useful in malarious fevers of a low type" (Dr. Hazlitt, in Watt's Dictionary).

"Strychnine is a valuable drug in the bronchitis of the debilitated. Its action as an expectorant appears to be considerable" (Surgeon S. H. Browne, in Watt's Dictionary).

In modern medicine nux-vomica is prescribed with advantage in the catarrhal dyspepsia, accompanied by flatulence and want of contractile power in the intestines which is so common in India. In such cases it appears

to be preferable to the alkaloid strychnine. As a general tonic in relaxed conditions of the muscular system, and in delirium tremens, strychnine is an invaluable remedy. It is also used with advantage as a stimulant of the nervous centres in some forms of paralysis after the symptoms of irritation have sub-sided, and in sexual debility. Applied externally nuxvomica acts as an irritant, and if the skin is abraded its active principles may be absorbed and give rise to symptoms of poisoning.

Prof. C. Pacesi (Bollitina Farmaceutica, 1881.) has demonstrated the antiseptic properties of the different species of *Strychnos* and their alkaloids, and suggests that the effectiveness of the species of *Strychnos* which are used in tropical countries against fevers and poisonous bites may possibly be owing to the antiseptic and anti-fermentative power of alkaloids. *Pharmacographica Indica*, Vol. II. p. 1466).

Lauder Brunton (Practitioner, Jan. 1888.) recommends strychnine in sleeplessness due to mental fatigue, caused by strain or worry as preferable to opium, chloral and bromides. He has given 1/200 to 1/100 grain of the alkaloid, or 5 to 10 minims of tincture of nuxvomica at bed-time, the dose being repeated if the patient wake within one or two hours.

G. A. Gibson (Practitioner, Dec., 1889.) strongly recommends the hypodermic injection of strychnine in case of opium narcosis or in any case of narcotic poisoning where there occurs any irregularity or interruption of the breathing that appears to threaten a failure of the respiratory centre. (*Pharmacographica Indica*, Vol. II. p. 466).

It contains the two well known alkaloids-strychnine and brucine.

A new alkaloid, *struxine*, has been found in *Nux vomica*, associated with strychnine and brucine. In neutralising the acid solution of the crude alkaloid sulphates of *Nux vomica*, the new alkaloid separates as a base when the liquor is just neutral or is still slightly acid, while strychnine and brucine remain in solution. When purified by reprecipitation and crystallisation from alcohol, struxine was obtained as colourless crystals, which begin to char when heated at about 250° C. Its mol. wt. is 371 and probable formula, $C_{21}H_{30}N_3O_4$. It forms normal and acid salts. Only a few lots of *Nux vomica*, contained this substance, and then the quantities yielded differed greatly among the different lots. All the beans which contained this alkaloid were from shipments made from Cochin-China; these lots, which consisted mostly of small beans, insect-eaten and partly decomposed by prolonged exposure in wet fields, contained the largest percentage of the alkaloid (average 0.1%). It is supposed that the new alkaloid is a product of decomposition, by fermentation or oxidation of either strychnine or brucine. *J. Ch. I* for 15th March, 1916 p. 246.

In the germination of *Strychnos Nux Vomica*, brucine is formed first in all parts. Both strychnine and brucine are formed independently of light in the germination leaves before the chlorophyll makes its appearance. The alkaloidal content of the different parts in percentages is:—Original seeds 2.98, seed husks after exfoliation 2.11, young germination rootlets 4.48, older germination rootlets 3.72, hypocotyledonous axis 2.43, young cotyledons whilst yellow 6.62, when older and green 4.65.—(*J. Ch. I.* for 15th February, 1911, p. 151).

The fat is obtained from the seeds of nux-vomica by extraction with ether, and is a by-product in the manufacture of the alkaloids, strychnine and brucine. The yield of the fat is about 4 per cent. (Harvey and Wilkie), 4.2 per cent. (Schroeder). The fat melts at about 29°, it has a low saponification value below 166 and 170, iodine value, 69 to 79. A considerable amount of unsaponifiable matter is present, from 12 to 16 per cent. According to Schroeder (1905) the fat contains 8.6 per cent. of solid glycerides (palmitin and arachin) and 74.5 per cent. of olein. (Hooper).

Nux vomica contains 1—2% of a concrete oil or fat which consists principally of the glycerides of capric, caprylic, caproic, butyric and palmitic acids. The unsaponifiable matter consists of a satd. alc. $C_{35}H_{59}OH$, and an unsatd. alc. $C_{32}H_{54}O.5H_2O$ behaving like syroceryl alc. The oil is dark brown in color and possesses an unpleasant odor. An analysis gave: $d_{15.5}^{100}$ 0.892, sol. point 60°, sapon. no. 152, I no. (Hubl) 54. Reichert-Wollny no. 1.0, acetyl no. 31.2, acid no. 33.7.—(Chemical Abstracts May 20, 1916 p. 1404.

The unsaponifiable portion of the oil may be separated into the fractions, (a) a resinous portion, (b) a phytosterol, m.p. 158°, (c) an alc., $C_{35}H_{57}OH$ ($C_nH_{2n}-120$) or $C_{35}H_{59}OH$ ($C_nH_{2n}-10O$), m.p. 90°, $[a]_D +90^\circ$, mol. wt. 496. The alc. contains no double bond and is probably related to amyrin. Esters of Ac OH, propionic, benzoic and salicylic acids were prepared. Of the Ac OH ester the molecular wt. = 512, $[a]_D = +74.47$. The alc., $C_{32}H_{53}OH$, possesses double bond in the side chain, its properties coincide in many respects with those of the syroceryl alc. of De la Rue and Mueller. No sepn. of the unsaponifiable portions of the oil could be effected according to the method of Darmstaedter and Lifschuetz. (Ch. A., March 20, 1916, p. 800.)

790. *S. potatorum*, Linn. f. H.F.B.I., IV. 90;
Roxb. 194.

Habitat:—Deccan Peninsula, extending north-west to the Sone river.

Sans.:—Kátaka, Ambu-prasáda.

Vern.:—Nirmali (Hind. and Beng.); Chil-binj (Dec.); Tetran-kottai (Tam.); Chillaginjálu (Tel.); Titrán-parala (Mal.); Chiligidda; Chell-bígá (Kan.); Nírmali, nivali (Mar.); Kamonyeki (Burm.). Gapra (Bomb.).

English:—Clearing Nut Tree.

A moderate-sized, deciduous tree, attaining 40ft. Bark $\frac{1}{2}$ – $\frac{3}{4}$ in. thick, black or brownish-black, corky, very deeply and narrowly cleft vertically, so as to form thin ridges which easily break off. Wood white when fresh cut, turning yellowish-grey on exposure, hard, close-grained, no heartwood (Gamble), wholly glabrous; trunk often fluted. Leaves $2\frac{1}{2}$ by lin., ovate or elliptic, coriaceous, sessile, glabrous or nearly so, acute at both ends, hardly

acuminate, 3-nerved from the base, or more often the lateral nerves springing much higher. Petiole very short, $\frac{1}{10}$ in. Cymes axillary, lin. diam., nearly glabrous, nearly sessile. Flowers white, fragrant. Corolla $\frac{1}{8}$ – $\frac{1}{4}$ in., campanulate, 2-4 times the length of lobes; tufts of white hair at the mouth, between stamens. Anther-cells oblong, glabrous. Style long, cylindric from a conical base, glabrous. Stigma small, distinctly 2-lobed. Berry black when ripe, $\frac{2}{3}$ in. diam. Seeds 1 or 2, hemispheric, subpeltate, hardly discoid, $\frac{1}{4}$ – $\frac{1}{2}$ in. diam.

Uses:—"The use of the seeds, for the purpose of clearing muddy water, is as old as Susruta, who mentions it in his chapter on water. Medicinally, they are chiefly used as a local application in eye diseases. The seeds are rubbed with honey and a little camphor, and the mixture applied to the eyes in lachrymation or copious watering from them. Rubbed with water and rock salt, they are applied to chemosis in the conjunctiva" (*Hindu Mat. Med.*) "The seeds of this tree are devoid of poisonous properties, and are used in native practice as an emetic (Ainslie), as a remedy in diabetes (Kirkpatrick), gonorrhœa (*Taleef Shereef*), &c. Their chief use, however, is as a means of clearing muddy water, hence their Anglo-Indian name, *Clearing Nut*. Looked at in this point of view, they may be regarded as a valuable aid to medical officers and others during the marches of troops in India in the rainy season, when little but muddy water can be obtained. Dr. Pareira suggests that this property depends upon the albumen and casein which they contain. If the seeds be sliced and digested in water, they yield a thick mucilaginous liquid, which, when boiled, yields a coagulum (albumen), and, by subsequent addition of acetic acid, it furnishes a further coagulum (*casein*)" (*Pharm. Ind.*). Mahomedan writers describe them as cold and dry, that when applied externally to the abdomen they relieve colic; they also notice their use to strengthen the sight and as a remedy in snake-bite (*Dymock*).

The seeds used by the natives of Madras in diabetes and gonorrhœa (*Drury*).

Dr. Bidie doubts emetic properties of *S. potatorum*.

In long-standing and chronic diarrhœa which resists all treatment, one-half or a full seed, rubbed up into a fine paste with some butter milk and given internally for one week, is effectual (Surgron-Major Thomson, C. I, E., in Watt's Dictionary).

Regarding its chemical composition, the authors of the Pharmacographia Indica, Vol. II. p. 507 write :—

We found the seeds as difficult to powder as those of *Nux-vomica*, and they had to be treated in a similar manner before they could be pulverised. The powdered seeds were boiled with strong alcohol acidulated with sulphuric acid, caustic potash in slight excess added, and then acetic acid to acid reaction. The solution was then evaporated to dryness on the water bath. Benzole extracted traces of an oily principle when agitated with the acid extract. After separation of the benzole the still acid solution was agitated with ether which extracted resinous matter which became of a deep yellow colour on the addition of alkalies. The aqueous solution was then rendered alkaline with carbonate of soda and agitated first with ether and subsequently with chloroform.

In both cases intensely bitter extracts were obtained, the ether extract exceeding that yielded by chloroform. These extracts were purified and afforded all the reactions for alkaloids, the special colour reactions in both instances indicating the presence of brucia and it is interesting to note that the larger amount was found in the ether extract. Portions of these extracts were injected into frogs, but beyond inducing muscular irritability no tetanizing effects were induced. Acetates of the alkaloids were employed for the hypodermic injections. We failed in obtaining any reactions for the presence of strychnia in either of the extracts. We are not however prepared to state that other alkaloidal principles are not associated with brucia in the seeds. We noted that on the evaporation of the alcoholic tincture of the seeds acidulated with sulphuric acid, a beautiful violet coloration was developed on the sides of the capsule. We also obtained a similar reaction with *Nux-vomica* seeds. Phosphoric acid, however, failed to afford this coloration, and it was not afforded either by hydrochloric or acetic acids.

N. O. GENTIANACEÆ.

791. *Exacum tetragonum*, Roxb. H.F.B.I., IV. 95 ;
Roxb 133.

Vern. :—Titakhana (H.) ; Kûchuri (B.) Orka phûl (Santal.).

Habitat :—North India, common, from Kumaon to Central India, Bhotan and the Khasia Mts.

An annual herb. Stems quadrangular, erect, 1-4ft., branching. Leaves opposite, sessile, stem clasping, broadly lanceolate,

5-nerved, $1\frac{1}{2}$ -5 acute, or $\frac{2}{3}$ - $1\frac{1}{2}$ in., subobtus. Flowers blue, $1\frac{1}{4}$ in. diam., in terminal panicles. Calyx deeply 4-lobed; lobes ovate, keeled, long-pointed. Corolla-tube inflated, much shorter than the 4 ovate acute lobes. Stamens 4, filaments short. Anthers narrowly oblong, $\frac{1}{4}$ in. straight, opening by two terminal pores. Ovary 2-celled; style long, stigma capitate, entire; ovules numerous, capsule globose.

Use :—The plant is used as a tonic in fevers and as a stomachic bitter (Ph. Ind.)

792. *E. bicolor* Roxb. H.F.B.I., IV. 96. Roxb. 133.

Vern. :—Bará-charáyatah (H.)

Habitat :—Dekkan Peninsula, frequent from the Konkan and Orissa to Courtallam.

Erect, annual herbs. Stems much branched above, slender, glandular. Leaves on very short petioles, $1\frac{1}{2}$ -2 in., oval, tapering on both ends, acute, 3-(or 5-) nerved. Flowers 4-merous, small, on long rigid pedicels, rather small, pale, violet-blue or white; Calyx-segments ovate, very acute, wings wide, cordate or subcordate at base, strongly veined. Corolla $\frac{5}{8}$ in. diam., lobes 4, lanceolate, acute; anthers 4, $\frac{1}{10}$ in., not tapering, capsule globose (Trimen). In the Flora of British India, (Vol. iv. p. 96), Mr. C. B. Clarke describes it thus :—

Stem quadrangular, leaves sessile, ovate-lanceolate, 5-nerved. Calyx-lobes ovate, suddenly caudate, keel winged, anthers $\frac{1}{3}$ - $\frac{1}{2}$ in. curved. C. B. Clarke further remarks that *E. bicolor* is considered by Mr. Bentham only a form of *E. tetragonum* Roxb. but differs from that and the larger *E. Perrotteta* in the unsymmetric flowers, the buds distinctly curved at the tips and the anther-cells curved and tapering upwards. The flowers are larger than those of *E. tetragonum*, smaller than those of *E. Perrotteta*. The corolla-segments are (very generally) white on the lower half, full azure-blue in the upper.

Use :—The plant possesses tonic and stomachic properties, and may well be substituted for gentian (Ph. Ind.).

793. *E. pedunculatum*, Linn., H.F.B.I., IV. 97.

Syn. :—*E. sulcatum*, Roxb. 134.

Habitat :—Throughout India, from Oudh and Bengal to Ceylon.

A small, slender herb. Stem slender, erect, much-branched, quadrangular, 3-12in. Leaves $1\frac{3}{4}$ - $\frac{1}{2}$ in., subsessile, elliptic or lanceolate, 3-nerved. Flowers, small, 4-merous. Cymes terminal, many-fid, Peduncles $\frac{1}{8}$ - $\frac{1}{2}$ in., suberect, rigid. Calyx-lobes $\frac{1}{8}$ - $\frac{1}{2}$ in., ovate, acuminate ; wing distinct, lanceolate. Corolla-lobes blue, $\frac{1}{4}$ - $\frac{1}{2}$ in., elliptic. Anthers $\frac{1}{8}$ in., scarcely attenuate upwards, dehiscing finally half-way to the base. Capsule $\frac{1}{4}$ in. Sub-globose.

Uses :—The plant is less bitter than chiretta and more than gentian, for which it may be substituted. Dr. Bidie directs the plant to be gathered when the flowers begin to fade and to be carefully dried in the shade. For administration, it may be given in infusion and tincture of the same strength as those of chiretta (Ph. Ind.).

794—*Enicostema littorale*, Blume, H.F.B.I., IV. 101 ; Roxb. 264.

Habitat :—Throughout India, from the Punjab and Gange-tic plain to Ceylon ; more frequent near the sea, not known in Bengal.

Vern :—Chota kiráyata (H.) ; Mamijwa (Bomb.) ; Manucha (Sind) ; Kadavinayi (Mar.) ; Vellurugu (Tam.) ; Nela-guli ; Nela-gulamidi (Tel.) ; Naichápíala (Bomb.).

A perennial herb. Stems several, from a woody base, erect or procumbent, 6-18in., sub-quadrangular or terete, glabrous, internodes short. Leaves opposite 1- $1\frac{3}{4}$ in., oblong-oval to oblong-linear, sessile, tapering to base, obtuse, rather thick, 3-nerved, the lateral nerves marginal and faint, pale glaucous green. Flowers numerous, crowded, white. Calyx glabrous, segments lanceolate, sub-acute. Corolla much longer than the Calyx ; tube wide, $\frac{1}{8}$ in., lobes much shorter than the tube, $\frac{1}{8}$ in., oval acute, elliptic, says C. B. Clarke. Stamens, included. Capsule about $\frac{1}{2}$ in., says Trimen ; $\frac{1}{8}$ - $\frac{1}{2}$ in., says Clarke. Seeds small. The root creeping, filiform. The whole plant is very bitter.

Uses :—It possesses marked bitterness, and, according to Dr. Cleghorn, it is much used by the natives of Madras as a

stomachic, as, in addition to its tonic property it is also somewhat laxative (Ph. Ind.).

The aerial and subterranean portions of this plant were examined separately; the former gave 34 per cent. of dry alcoholic extract and 15.7 per cent. of ash, and the latter 15.5 per cent. of dry alcoholic extract and 10.4 per cent. of ash. The bitter principle from both portions appeared to be identical and to have the characters of a glucoside. It was left as a varnish-like residue from the evaporation of its solution in chloroform, and was also soluble in ether, benzol, alcohol and water. It gave a reddish brown colour with strong sulphuric acid, which changed to a purplish tint after standing. The hydrolysis of the bitter principle with dilute hydrochloric acid resulted in the production of an agreeable aromatic substance, and the deposition of a flocculent light-brown colouring matter. (Pharmacographia Indica Vol. II p. 516.)

795. *Erythraea Roxburghii*, G. Don., H.F.B.I., IV. 102.

Syn.:—*Chironia centruaioides*, Roxb. 196.

Vern.:—Luntuk kurunai, kadavi-nái (Bomb.); Charáyatah (H.); Girmi, gima (B.); Gada-sigrik (Santal.); Jangli-kariátu (Guz).

Habitat:—Throughout India; from the Punjab and Bengal to Travancore. Common in Thana (Konkan), on walls.

An annual herb. Stem 2-12 in. high, 4 angled. Radical leaves numerous, persistent, obovate or elliptic, 1 by $\frac{1}{2}$ in., usually obtuse. Cauline leaves smaller, narrower. Cymes repeatedly dichotomous, with long pedicelled flower in each fork. Pedicels in the fork usually $\frac{1}{4}$ to $\frac{1}{2}$ in. Bracts not prominent. Calyx $\frac{1}{2}$ in. Corolla-tube exceeding $\frac{1}{4}$ in, lobes very small, Corolla-tube much longer than the Calyx. Lobes rose-coloured. Anthers at length, spirally twisted. Stigma large, 2-lamellate. Capsule narrowly oblong.

Use:—The whole plant is described as powerfully bitter, and is held in high esteem by the natives (Bengal Dispensatory, p. 461). It doubtless might prove a useful tonic (Ph. Ind.). It is used by the Santals in fever. (Revd. A. Campbell.) It is used as a substitute for chiretta, especially in Bengal.

796. *Canscora diffusa*, Br. H.F.B.I., IV. 103.

Syn.:—*Pladera virgata*, Roxb. 134.

Vern. :—Kyout pan (Burm).

Habitat :—Throughout India.

A slender, much branched annual, 2 ft. or more in height. Stems obtusely 4-angled. Leaves membranous, 3-nerved, 1 in. long, the lower lanceolate or elliptic and often petioled; upper sessile, broadly ovate, acute or apiculate, rounded at the base, uppermost leaves much smaller. Flowers pink, in lax diffuse panicles, pedicels filiform, the ultimate bracts very minute. Calyx $\frac{1}{4}$ in. long, not winged; teeth lanceolate, acute. Corolla in. long; tube $\frac{1}{4}$ in., green; lobes unequal, obtuse. Stamens 4, one of which is fertile and larger than the others and inserted higher up. Capsule narrowly oblong, nearly as long as the calyx, membranous. (Duthie).

Use. :—Used as a substitute for *C. decussata*.

797. *C. decussata*, Roem. & Sch. H.F.B.I., IV 104.

Syn. :—*Pladera decussata*, Roxb. 135.

Sans. :—Sankhapushphi; Dandotpala.

Vern. :—Sankhāhuli (H.); Dān kuni (B.); Shankhapushappi (Cutch).

It seems probable that the Sanskrit names are applied in different parts of the country to more than one species of *Canscora*. Rheede (*Hort. Mal.* X., t. 52) figures *C. perfoliata* with the Malayalam name of the *Cans/an-cora*, from which the botanical name of the genus has been derived. (Dymock).

Habitat :—Valleys of Simla, Himalaya, abundant in Bengal plains. Throughout India, Burma, Ceylon.

Stems erect, 6-18 in. 4-winged, branched above. Leaves, rather numerous, sessile, lowest one about 1 in., upper ones smaller, all ovate or oblong-lanceolate, rounded at base, acute, 3-nerved. Peduncles long, quadrangular, strongly winged. Calyx nearly $\frac{1}{2}$ in., 4-winged; segments very short, lanceolate, very acute. Corolla-lobes rounded, 2 lower ones much narrower. Flowers white or pale yellow. Stamens 4, one perfect, anthers small and imperfect (Collett). Filaments short. Ovary 1-celled, style short, stigma 2-lobed, capsule oblong. Seeds large dark brown, reticulate.

The different species of *Canscora* are bitterish annual plants which grow on moist situations during, or immediately after the rainy season.

Use:—In Hindu medicine this plant is regarded as laxative, alterative and tonic, and is much praised as a nervine. It is also used in insanity, epilepsy, and nervous debility. The fresh juice of the plant is given in all cases of insanity, in doses of about an ounce (Dutt).

798. *Gentiana tenella*, Fries, H.F.B.I., IV. 109.

Vern.:—Tita (Pb.).

Habitat:—Common in Kashmir and W. Himalaya.

An erect or straggling herb, 4-lineolate, branched. Stem 2-10in. Leaves oblong or ovate, $\frac{1}{2}$ by $\frac{1}{4}$ in., lowest spatulate. Pedicels (many of them) long, terminal, solitary, 1-3 $\frac{1}{2}$ in. Calyx-tube hardly any; lobes $\frac{1}{2}$ by $\frac{1}{10}$ in., elliptic, often unequal. Corolla fimbriate in the throat, tubular, 5-lobed, tube $\frac{1}{2}$ by $\frac{1}{6}$ - $\frac{1}{5}$ in., lobes $\frac{1}{4}$ in., elliptic, capsule $\frac{2}{3}$ in., oblong linear, sessile.

Use:—Aitchison says that in Lahoul a decoction of the leaves and stems of this and other species is given in fevers (Watt).

799. *G. Kurroo*, Royle, H.F.B.I. IV. 117

Vern.:—Karú, kútki (Beng. and Hind.); Nilkant, kamalphul, milakil (Pb.).

Habitat:—Common in Kashmir and N.-W. Himalaya.

Rootstock thick. Stems tufted, decumbent, 4-12in. Leaves narrowly oblong. Radical leaves collected into a rosette. 3-5 by $\frac{1}{4}$ - $\frac{1}{2}$ in. Stem-leaves lin., narrower. Flowers blue, spotted with white, 1 $\frac{3}{4}$ -2in. long, $\frac{3}{4}$ in. diam., solitary or racemose. Calyx about half as long as the Corolla; lobes linear. Corolla 5-lobed. Capsule oblong (Collett), $\frac{3}{4}$ by $\frac{1}{2}$ in. Stalk $\frac{1}{4}$ - $\frac{1}{2}$ in. Seeds twice as long as broad, acute at one end, subcordate at the other (C. B. Clarke).

Uses:—The root is medicinally used as a bitter tonic, and as substitute for the true Gentian. On the hills it is viewed as a febrifuge. Used principally as a *masala* for fattening horses (Calthrop). Acts as an aperient in larger doses (Gray). Said

to diminish the fever of phthisis (Peacock). Used for urinary affections (Roxb.).

The authors of the *Pharmacographia Indica* (Vol. II p. 510) write :—"In the *Dictionary of the Economic Products of India* (III p. 486), it is stated that *G. Kurroo* is largely exported to the plains along with the *P. Kurroo* as the officinal *Karu* or *Katki*, but we have been unable to find anything like the root of a *Gentian* in the original parcels of that drug which arrive from the hills. We believe that all the references to this plant, as a drug in use in the plains, belong properly to *Pierorhiza*, and that *G. Kurroo* is only used in the Himalayas and northern districts of the Punjab."

The roots contain a bitter principle similar to that of the European species, it is soluble in water and alcohol, and is not thrown down by neutral acetate of lead, but is precipitated by ammoniacal acetate; and liberated from the precipitate by sulphuretted hydrogen. It can be extracted from an aqueous solution by agitation with benzine or ether but more readily by chloroform. Ferric chloride does not precipitate it nor does tannin. Sulphuric acid colours it reddish and the dilute acid decomposes it with the production of sugar. The root also contains a yellow, transparent, brittle resin, resembling mastic, in softening at the temperature of the mouth; it is odourless and tasteless, neutral in reaction, and insoluble in alkaline liquors. The presence of this resin to the extent of nearly 20 per cent. of the dried root should at once distinguish this *Gentian* from other species. (*Pharmacographia Indica*, Vol. II. p. 510-511.)

800. *G. decumbens*, Linn., H.F.B.I., IV. 117.

Habitat:—Baltistan and Western Tibet, eastwards to Lahoul; common on the Karakorum.

Stoutish herbs. Rootstock stout. Flowering stems 2-10 in., simple. Radical leaves 2 by $\frac{1}{4}$ - $\frac{1}{3}$ in.; cauline leaves 1-1 $\frac{1}{2}$ in., oblong or elliptic, connate at the base into a tube. Flowers 1-2, subsessile in each upper axil, the upper 3-7 approximate, subcapitate, the axillary clusters subremote or wanting. Calyx very unequal, often spathaceous or some of the teeth ovate, suddenly linear—pointed; Calyx-tube $\frac{1}{3}$ in.; lobes $\frac{1}{2}$ in. but the tube is often split one side nearly to the base; the lobes very unequal, 2-4, linear, 1-2, ovate, obtuse or obovate, with linear teeth. Corolla $\frac{3}{4}$ -1 in., funnel-shaped, lobes rounded. Capsule $\frac{1}{2}$ by $\frac{1}{3}$ in., stalk $\frac{1}{4}$ - $\frac{1}{2}$ in. Seeds oblong, trigonous, falcate, twice as long as broad, subobtusate at both ends, testa close.

Uses:—A tincture prepared of this plant has been used as a stomachic by the Lahoul Missionaries (Stewart).

801. *Swertia purpurascens*, Wall. H.F.B.I., IV. 121.
Vern. :—Chiretta (H.).

Habitat :—Temperate North West Himalaya, from Kashmir to Kumaon.

An annual herb, with stems 8-36in., solid, erect, terete, or 4-lanceolate. Leaves opposite, 3-1-nerved, $1\frac{1}{2}$ by $\frac{1}{2}$ in., oblong or lanceolate, base narrowed, lowest sub-obtuse; uppermost acute, glabrous. Panicles divaricate, many-flowered, leafy; pedicels often clustered. Flowers. 5-merous Sepals $\frac{1}{2}$ in., almost free, oblong, 1-nerved. Corolla-lobe $\frac{1}{4}$ in., ovate, acute, purple or dark red, reflexed in flower; pits solitary near the base of each lobe, horse-shoe-shaped, naked. Stamen tube erect, filaments puberulous, united into a short tube free from the Corolla. Anthers elliptic-lanceolate, much acuminate; style long; stigmas sub-linear. Seeds $\frac{1}{50}$ in. diam., globose, smooth, light-yellow when ripe. "This species is recognised at once by the red-purple much-reflexed corolla-lobes." (C. B. Clarke).

Uses :—Collected as a substitute for true *chirettah* and exported to the plains.

802. *S paniculata*, Wall, H.F.B.I., IV. 122.

Vern. :—Kadavi (Mar.).

Habitat :—Temperate Western Himalaya, from Kashmir to Nepal.

Close resemblance to *S. purpurascens* when dried. Leaves oblong or lanceolate, 3-1-nerved. Sepals $\frac{1}{2}$ in., oblong, acute, sub-1-nerved. Corolla-lobes $\frac{1}{4}$ in., ovate, acute, white in the upper half, patent, not reflexed in flower; pit very near the base of the Corolla, 1 to each lobe, naked; near the base of the Corolla-lobe are two purple or lurid-green sub-glandular marks, sometimes confluent into one. Filaments hardly dilated downwards, not puberulous, linear, separately attached to the Corolla-tube. Anthers oblong, not hastate. Style long, stigmas linear. Capsule $\frac{1}{2}$ in., elliptic-lanceolate, acuminate. Seeds as of *S. purpurascens*, but rather smaller.

Use :—Used as a substitute for true *chirettah*.

803. *S. Chirata*, Ham. H.F.B.I., IV. 124.

Syn.:—*Gentiana Chirayta*, Roxb. 264. *Ophelia Chirata*, Griseb.

Vern.:—Charayatah (Hind. and Dec.); Qasabuzzarirah (Arab. and Pers.); Shiratkuchchi, nila-vémbu (Tam.); Nila vém (Tel.); Nila-véppa (Mal.); Nela-bevu (Kan.); Kiratatikta bhunimba (Sans.); Chirétá (Beng.); Kiráyat (Mr.); Chiravata (Guz.); Sekhági (Burm.); Chiráita, kiráíta (Bom.).

Habitat.:—Temperate Himalaya, from Kashmir to Bhotan and Khasia Mts.

Perennial herbs. Stem 2-5ft., 4-lineolate or subterete. Leaves 2 by $\frac{3}{4}$ in., the lower often much larger sometimes petiol-
ed. Cauline leaves subsessile, elliptic acute, 5-nerved. Panicles many-fid, large, leafy. Pedicels 0- $\frac{3}{4}$ in., fascicled, mostly short. Flowers 4-merous. Calyx-lobes $\frac{1}{8}$ in., lanceolate. Corolla lurid-green, yellow near the base of each lobe, 2 glandular depressions, each terminated by long hairs. Corolla-lobes $\frac{1}{4}$ in., ovate, acuminate, more or less purple-nerved. Filaments linear, free. Anthers oblong. Style cylindric. Stigma oblong. Capsule $\frac{1}{4}$ in., and upwards, ovate, acute; seeds $\frac{1}{8}$ in., polyhedral, smooth, testa close, not reticulated.

Uses.:—The medicinal herb, as met with in the bazars, consists of bundles of dried twigs of brownish colour, "and very bitter, but pleasant taste. The whole plant is used medicinally, but the root is said to be the most powerful. The natives consider it as tonic, stomachic and febrifuge, and prescribe a decoction or infusion of it, in the quantity of a small tea-cupful, twice daily" (*Ainslie, Mat. Med. II., p. 373*). Drury says it should not be taken as a decoction, but in infusion or watery extract or as a tincture. The boiling would, according to some others, injure the strength of the drug. Chiretta is much prized in India as a powerful tonic, pure bitter, without aroma or astringency. It is more bitter than English Gentian, and, while little used in Europe, it is reported to be especially serviceable in the dyspepsia of gouty subjects (*Bentley & Trimen*). The Sanskrit name *Kiratatikta* means "the bitter plant of the *Kiratas*, an outcast race of the mountaineers in

the North of India." It is sometimes mentioned as *Naipala*, indicating its coming from Nepal. Chiretta possesses the property of a bitter tonic, but, unlike most other medicines of this class, it does not constipate the bowels, but rather tends to produce a regular action. It causes a free discharge of bile while promoting a more healthy action, hence its position in European practice as a tonic to gouty persons. In his *Hindu Materia Medica*, U. C. Dutt says it is tonic, febrifuge and laxative, and is used in fever, burning of the body, intestinal worms and skin diseases. It is particularly useful as a tonic or mild febrifuge in fever. A powder containing about fifty ingredients and known as *Sudarsana churna* is much used in chronic febrile diseases by native doctors. It is an excellent bitter for children, and should be taken every morning, then discontinued for a time, thereafter to be resumed until the desired action has been produced. Moodeen Sheriff Khan Bahadur and several other authors have drawn attention to the adulterants of this most valuable medicine. Those most frequently seen are *S. angustifolia*, *Ham. S. decussata*. *Nimmo*; *S. elegans*, *Wight*. (*vide* Balfour's *Cyclopedia of India*, 3rd Edition, Vol. I., p. 701).

At the request of the authors of the *Pharmacographia*, a chemical examination of chiretta was made by Höhn under the direction of Professor Ludwig of Jena. The chief results may be thus described. Among the bitter principles of the drug, Ophelic Acid, $C^{11}H^{20}O^2$, occurs in the largest proportion. It is an amorphous, viscid, yellow substance of an acidulous, persistently bitter taste, and a faint gentian-like odour. With basic acetate of lead, it produces an abundant yellow precipitate. Ophelic acid does not form an insoluble compound with tannin; it dissolves in water, alcohol and ether. The first solution causes the separation of protoxide of copper from an alkaline tartrate of that metal.

A second bitter principle, Chiratin, $C^{27}H^{44}O^{12}$, may be removed by means of tannic acid, with which it forms an insoluble compound. Chiratin is neutral, not distinctly crystalline, light yellow hygroscopic powder, soluble in alcohol, ether and in warm water. By boiling hydrochloric acid, it is decomposed into Chiratogenin, $C^{13}H^{24}O^4$, and Ophelic acid. Chiratogenin is a brownish, amorphous substance, soluble in alcohol but not in water, nor yielding a tannic compound. No sugar is formed in this decomposition.

The results exhibit no analogy to those obtained in the analysis of the European gentians. Finally Höhn remarked in chiretta a crystallisable, tasteless yellow substance, but its quantity was so minute that no investigation of it could be made. The leaves of chiretta, dried at $100^{\circ}C$, afforded 7.5 per

cent. of ash ; the stem 3·7, salts of potassium and calcium prevailing in both. (Pharmacographia, 2nd Ed., p. 437).

804. *S. angustifolia*, Ham. H.F.B.I., IV. 125.

Vern. :—Pahâri Chirâyatah (H.) ; Pahâdi Kiraitâ (Mar.).

Habitat :—Subtropical Himalaya, from Chenab to Bhotan, common.

Stems 1-3ft., 4-winged. Leaves narrowly lanceolate, sub-l-nerved, narrowed at the base, sepals oblong-linear, equalling the Corolla, in Wallich's type, often $\frac{1}{2}$ - $\frac{3}{4}$ in., and greatly exceeding the Corolla. Corolla-lobes $\frac{1}{4}$ - $\frac{1}{2}$ in., usually white, with blue or black dots never lurid ; with one large orbicular gland near the base, "the large depression usually minutely pubescent on the margin, and partly closed by a scale" (C. B. Clarke). Stamens linear ; anthers oblong, scarcely hastate, Capsule $\frac{1}{2}$ by $\frac{1}{2}$ in., ovate. Seeds $\frac{1}{16}$ in., polyhedral ; testa somewhat loose, glistening along the edges.

Uses :—In the United Provinces *O. angustifolia*, D. Don, a common Himalayan species, is much used instead of *O. Chirata*, and is called *Pahari* or *Hill Chiretta*, while the officinal plant, imported from the plains, is called *Dakhani* or *Southern Chiretta* (Royle).

805. *S. affinis*, Clarke. H.F.B.I., IV. 126.

Habitat :—Deccan Peninsula, from Chota Nagpore to the Pulneys.

Stems annual, erect, panicled, solid, virgate ; 1-3ft. Leaves $1\frac{3}{4}$ by $\frac{1}{2}$ in., lanceolate, 3-nerved, base narrow. Cymes forming an elongate lax panicle. Panicle-branches sharply quadrangular ; pedicels 0·lin., flowers 4-merous, not clustered. Sepals $\frac{1}{2}$ in., narrowly lanceolate. Corolla-lobes $\frac{1}{4}$ by $\frac{1}{2}$ in. long, oblong, shortly acute or subobtuse, white or with blue nerves, orbicular gland near the base large, completely covered by the large scale with pubescent margin. Filaments linear, not or scarcely dilated, free or nearly so ; anthers oblong, not or obscurely cordate. Style short, cylindric ; stigmas oblong. Capsule

ovate, acute, about as long as the Corolla. Seeds $\frac{1}{10}$ in., polyhedral; testa close, minutely reticulated, so that the seeds appear often glistening (C. B. Clarke).

Uses :—According to Dr. Cleghorn (*Indian Annals of Med. Sci.*, vol. iii., p. 271), *O. elegans*, *Wight*, which inhabits the mountains of the Madras Peninsula, possesses powerful and persistent bitterness. He states that frequent trials with it confirm the belief that it exercises a tonic influence on the digestive organs, thereby improving the general health; it appears also to possess some power as an antiperiodic. It is best given in the form of infusions in the proportion of two drachms to a pint of cold water. It appears equal, if not superior, to the officinal *Chiretta* (Ph. Ind.).

806. *S. decussata*, *Nimmo*. H.F.B.I., IV. 127.

Vern.—Silájit (Dec.); Kadú, (meaning “bitter” Mahablesli-war).

Habitat :—Common in the Western Deccan Peninsula, from the Concan to Travancore.

Herbs, with stems 1-3ft., terete or 4-winged. Leaves sessile, ovate-obtuse, $1\frac{1}{4}$ by $\frac{3}{4}$ in., numerous, approximate, decussate, 3-5-nerved. Corymbs very dense. Pedicels $0\frac{1}{2}$ in., mostly short. Sepals $\frac{1}{4}$ - $\frac{1}{2}$ in., narrowly lanceolate. Corolla-lobes white, with blue nerves, with a round depression at the base of each, $\frac{1}{3}$ by $\frac{1}{2}$ in., broadly oblong, shortly acute; covering scale shortly hairy, not very long.

Uses :—It forms an excellent substitute for *Chiretta*, and is so used in Bombay (Dalzell and Gibson, *Bombay Flora* p. 156). Particular attention has been called to it by Dr. Broughton *Bombay Med. Phys. Trans.* vol. vi., N. S., App., p. 58). The dried root, he states, occurs in pieces about two inches in length, of a diameter of a quill, giving off two or three rootlets, covered with a whitish brown epidermis, wrinkled longitudinally, white internally; brittle. He considers that its medicinal action and uses are similar to those of *Gentian* and *Chiretta*, for which it may be advantageously

substituted. The dried plant appears also to be used for the same purposes (Ph. Ind.).

This and other species of *Ophelia* are common throughout the Himalaya, and several others occur in the mountains of the Madras Peninsula. They all possess strong bitter properties, and may, therefore, where they are indigneous, be substituted for the officinal *Chiretta*, which is rare to the west of Nepal, and is not found in Central or Southren India.

807. *Menyanthes trifoliata*, Linn. H.F.B.I., IV.
130.

Habitat:—Western Himalaya; Kashmir.

Perennial herbs. Stems covered by lax sheathing petioles; the lower leafless. Leaves alternate, 3-foliate, leaflets elliptic or oblong-obtuse, entire or obscurely wavy, subsessile 2 by 1 in. Petioles 3-8 in. Peduncle 3-6 in. Raceme 1-6 in. Pedicels $\frac{1}{2}$ - $\frac{3}{4}$ in. Flowers white or bluish. Sepals $\frac{1}{2}$ in. Corolla $\frac{1}{2}$ - $\frac{1}{2}$ in. Style $\frac{1}{4}$ in. Capsule $\frac{1}{4}$ - $\frac{1}{2}$ in., sometimes bifid nearly to the base. Seeds $\frac{1}{10}$ in.

Use:—The leaves, the Buckbean or Boybean, are considered a valuable tonic and reckoned as one of the best of gentians.

On the entire plant being extracted with boiling alcohol, a glucoside, meliatin, $C_{15}H_{22}O_9$ was isolated from the extract. The yield was about 30 grms. from 23 kilos of the plant. It has a bitter taste which becomes stronger after a short time. It melts at $223^{\circ}C$. on the Maquenne block, and at $222^{\circ}C$ in a capillary tube. The optical rotation in aqueous solution is $[\alpha]_D = -81.96^{\circ}$. It has no reducing action upon Fehling's Solution, and when hydrolysed by emulsion, dextrose is produced.—[M. Bridel, *Comptes rend*, 1911, abstracted in *J. Ch. I.*, July 15, 1911, p. 429].

N. O. HYDROPHYLLACEÆ.

808. *Hydrolea zeylanica*, Vahl. H.F.B.I., IV.
133; *Roxb.* 265.

Sans:—Langali.

Vern.:—Kasschara, isha-langulya (B.); Tsjeru-vallel (Malay).

Habitat:—Throughout India, in wet places.

An annual, unarmed herb. Stem 6-18 in., usually decumbent and rooting at nodes below, glabrous, rather succulent, with short

branches. Leaves membranous 1-2½ in., linear-oblong, shortly petioled, acute at both ends, glabrous but slightly ciliate on the margin. Flowers in racemes very numerous, bright light-blue. Pedicels rather long, curved, glabrous or with numerous short glandular hairs. "Inflorescence" says C. B. Clarke, "patently viscidly hairy, or (in Ceylon form) nearly glabrous." Racemes 1-2 in., bracts ¼-½ in., narrower. Cymes racemose, bracts leafy; sepals about ¼ in., oblong-linear, glabrous or with copious glandular hairs. Corolla nearly ½ in. diam., lobes ⅓ in. ovate, acute. Stamens exserted, filaments dilated at base or nearly filiform. Styles long, spreading. Capsule ovoid, oblong, shorter than the persistent enclosing striate (Trimen). Seeds many, minute, oblong.

Use:—The leaves, beaten into a pulp and applied as a poultice, are considered to have a cleaning and healing effect on neglected and callous ulcers. They apparently possess some antiseptic property.

N. O. BOARGINEÆ.

809. *Cordia Myxa*, Linn., H.F.B.I., IV. 136; *Roxb.* 198.

Vern.:—Lasora, bhokar (Gondi and Hind.); Dábk (Arab.); Suggistan (Pers.); Bohari, buhul, boho-dari (Beng.); Ninut (Lepcha); Vidi (Tam.); Thanet (Burm.); Bhokar (Mar.).

Habitat:—Throughout India.

A moderate-sized, deciduous, tree, 40 or 50 ft. high and usually, with a crooked trunk. Bark ½ to ¾ in. thick, grey or brown rough, with shallow longitudinal wrinkles and furrows. Wood greyish brown, moderately hard, no heartwood. Branchlets glabrous; young shoots silvery grey. Leaves alternate, thinly coriaceous 1-5 in. diam., entire or slightly obscurely hairy beneath when young, dentate from slightly scabrous to glabrous above, variable in shape from elliptic-lanceolate to broad-ovate, often with a rounded or cordate base, basal nerves 3, rarely 5, the first pair sub-basal. Petiole 1-2 in. long. Flowers small, male and hermaphrodite, often on the same tree, mostly pentamerous, white, in loose ebracteate corymbose cymes, 2-8 in.;

male larger, laxer, terminal, and on short lateral branches. But very near, globose. Calyx $\frac{1}{8}$ - $\frac{1}{4}$ in. at flower time, soon much accrescent, tubular campanulate, lobes very short. Corolla-tube $\frac{1}{10}$ - $\frac{1}{8}$ in., tube hairy within. Stamens exserted, filaments hairy below. Stigmas with long linear lobes. Fruit drupe, $\frac{1}{2}$ lin. long; when ripe yellowish brown, pink or nearly black, shining, but minutely rugose; endocarp rugose, very hard in a sweetish viscid, but translucent pulp, edible. Brandis says the pulp is transparent, but it is not quite so. C. B. Clarke calls the fruit a berry, yellow or pinkish, nearly always 1-seeded. Kanjilal says the Drupe is yellow, and glossy when ripe. The fruiting Calyx is $\frac{3}{4}$ in. diam., wide funnel-shaped, more or less distinctly striated longitudinally (Sebestin).

Uses:—According to Sanskrit writers, the bark is useful in calculous affections, strangury and catarrh. The ripe fruits are sweet, cooling and demulcent (U. C. Dutt).

The fruits were, in European practice, in considerable repute as an emollient and demulcent, especially in affections of the lungs and genito-urinary organs, but now have fallen into disuse. In doses of from ten to twelve drachms the pulp acts as a laxative. The bark, according to Horsfield (*Asiat. Journ.*, 1819), is one of the chief remedies of the Javanese, who employ it in fevers, &c. It is, apparently, a mild tonic (Ph. Ind.).

Teeth are rubbed with the bark to strengthen them. Pickles are prepared from the fruit. The bark contains a large amount of tannic acid (B. D. Basu).

The kernels are a good remedy in ringworm. The leaves are useful as an application to ulcers and in headache (Baden-Powell).

The juice of the bark, along with cocoanut oil, is given in gripes. The bark and also the unripe fruit are used as a mild tonic (Atkinson). The Santals use a powder of the bark as an external application in prurigo (Revd. A. Campbell).

810. *C. obliqua*, Willd. H.F.B.I., IV. 137.

Syn.:—*C. latifolia*, Roxb. 189.

Vern.:—Chhótá-lasórá, chhótá-laslása (Hind.); Chhoto-bolnaári (Beng.); Mokhatab (Arab.); Sugpistan (Pers.); Spiru-naruvili (Tam.); Chinna-botku (Tel.); Tana, tanusi (Burm.); Geedooree (Sind.); Vurgoond (Guz.); Bhokar (Dec.).

Habitat:—Western India, from the Punjab and Hindustan to Ceylon.

A middle-sized tree closely resembling *C. Myxa*. It is the *C. obliqua* of Wight's. Ic. t. 1378. Innovations fulvous-villous. Leaves alternate, ovate or orbicular, sub-3-nerved, young tomentose beneath, adult glabrous, entire or nearly so, densely and softly tomentose beneath, with stellate hairs. Basal nerves 3-5. Cystolith cells not conspicuous on surface of leaves. Corymbs divaricate, dichotomous, glabrous. Calyx glabrous without, or scarcely villous on the margin, $\frac{1}{2}$ - $\frac{1}{4}$ in. (at flower-time), tube campanulate; lobes distinct, densely villous within. Corolla-lobes $\frac{1}{2}$ - $\frac{1}{4}$ in. Berry lin. ovoid, sub-acute, 1-seeded.

Both kinds of fruit when dry are shrivelled, and of the color of a dry prune. The pulp of *C. obliqua* can be separated from the nut, that of *C. Myxa* cannot; on sawing through the nut a heavy disagreeable smell is observable. (Dymock).

Uses:—The fruit is used as an expectorant and astringent.

In Sind, it is regarded as demulcent (Stocks).

The fruit in its raw state contains a gum used beneficially in gonorrhœa. (T. N. Ghose, in Watt's Dictionary).

811. *C. obliqua*, Willd. *Var. Wallichii* H.F.B.I., IV. 137.

Habitat:—Western India, Lahore to Kurg.

A middle-sized tree, closely resembling *C. Myxa*, Linn.

Adult leaves densely stellately fulvous or white-tomentose beneath, calyx glabrescent without below, teeth densely fulvous-villous.

This is *C. obliqua*, *Var. B.* of all the old collectors, who have mixed it with *C. obliqua* type. The two are undoubtedly one; they differ in hairs *only*, and intermediately hairy examples occur. (Clarke).

Use:—It is used like *C. obliqua*, Willd.

Chemical composition.—The pulp of the fruit of *C. obliqua* freed from seeds had the following composition:—

	per cent.
Moisture	12.85
Extracted by hot water	64.25
Sugar (by copper estimation)	29.76
Acidity neutralizing Na HO	0.23
Alkalinity of ash as KHO	3.06
Total ash	8.85
Ash in insoluble residue	1.52

The alcoholic extract solution in water gave no indication of an alkaloid, and was not rendered turbid with lime water. Sebesten plums appear to have properties similar to prunes, as they exert a gentle laxative action when taken in any quantity.

A decoction of the bark of *C. Myxa* was not affected by iodine solution, and was only slightly turned green by ferric chloride. The alcoholic extract contained some white, transparent crystals belonging to the square prismatic system. They had no peculiar taste, were neutral in reaction and unaffected by alkaloidal reagents and the stronger mineral acids. The aqueous extract was dark-coloured, free from bitterness, and substance like cathartin was precipitated from it by six volumes of alcohol. Nothing was found in the bark to account for its reputed tonic action. Some simple crystals of calcium oxalate were present, and the reduction of this salt to carbonate, by burning, contributed largely to the 12.75 per cent. of ash.

812. *C. Rothii*, Ræm. and Sch. H.F.B.I., IV. 138.

Syn:—*C. angustifolia*, Roxb. 198.

Vern:—Gondi, gondni (H.); Liar, liáli, (Sind.); Narvilli (Tam.); Gondani (Mar.); Gondui, gundi (Bomb.); Gundi (Guz.)

Habitat:—West India, from the Punjab, Hurdwar and Scinde to Malabar.

A small or middle-sized tree, attaining 30ft. "Bark grey or brownish grey, with deep longitudinal furrows. Wood compact, hard; sapwood yellowish; heartwood brown, streaked in different shades. The bark when wounded yields a gum, and the liber is made into ropes" (Gamble). "The bands of wood-parenchyma broad, heartwood not scented," says Brandis. Leaves nearly opposite, cuneate-oblong, entire, stellate-pubescent beneath, rough above; pinnate nerves, 4-6 pairs; rather obscure;

blade 3-4 in., by 1½ in., narrowed into petiole ½ in. long. Flowers, white, generally tetrandrous, arranged in lax terminal or axillary pedunculate cymes; peduncles ¾ lin. long, pedicels short. Corymbs 1-3., small, pubescent or sub-pubescent. Calyx at flower-time ½ in., minutely pubescent. Corolla-lobes usually 4, ½ in. Filaments glabrous. Drupe ovoid, mucronate ½ in. long, glabrous, longitudinally striate, yellow or reddish-brown when ripe, with gelatinous edible pulp, usually 1-seeded.

Use:—The decoction of the bark possesses astringent properties and is used as a gargle (Ph. Ind.).

813. *C. vestita*, Hook. f. and Th. H.F.B.I., IV. 139.

Vern.:—Kúmbi, Karúk (Pb.); Kumpaimán, pin indák, chinta, ajánta, bairula, berula (H.). Latora (Oudh). Godela (Ajmere).

Habitat:—Sub-Himalayan tract, from the Jhelum to the Sarda river and Oudh.

A small deciduous tree, attaining 30 ft. Innovations fulvous-woolly. Bark ½ in. thick, dark grey, exfoliating when old in large woody scales; inner bark silvery grey. The wood has the same structure as that of *C. Rothii* and *C. Macleodii*, except that the concentric lines are more often interrupted. Leaves 3-6 by 2½-5 in., broad elliptic or orbicular, acuminate, coriaceous, scabrous above, tomentose beneath, until mature, base cuneate or cordate, not rounded. Lateral nerves 3-5 pair, the lowest sub-basal. The cystolith-cells on the upper surface of leaves conspicuous as raised, generally white disks on upper surface in this species and in *C. Macleodii* (Brandis). Petioles 1-1½. Flowers pedicelled, yellowish white, polygamous, in dense compound cymes, tomentose and woolly, the male flowers usually in unilateral racemes. Calyx ½ in. long, distinctly ribbed and furrowed outside, teeth unequal. Corolla-lobes ½ in., obovate-oblong, spreading; tube long as the lobe. Drupe (a berry, as C.B. Clarke calls it), ¾ in. ellipsoid, supported by the accrescent saucer-shaped Calyx and cuspidate with the remains of the style, filled inside with a gelatinous pulp. The fruit is edible.

Use:—Fruit used similarly to other species. (Watt).

814. *C. Macleodii* Hook. f. and Th. H.F.B.I., IV.
139.

Vern:—Dhengan, dhaman, dháian, dewan, dahi, dahipalás, dihgán (H.); Reuta porponda (Kol.); Bharwar, belannan (Karwar); Jugia (Santal.); Dhaiwan, dhaman, daiwas, dhaim, bhoti (Mar.); Bot (Gond.); Lauri Kassamar (Kurku); Gondu (Raj.); Godela (Merwara); Gadru (Ajmere).

Habitat:—Central India, the Concan and Belgaum.

A middle-sized, deciduous tree, attaining 40ft. Bark thick grey, soft, corky. Heartwood light-brown, beautifully mottled with dark veins, even-grained, very hard. Branchlets, underside of leaves, inflorescence and Calyx clothed with dense grey or tawny tomentum of stellate hair. Leaves alternate, sometimes sub-opposite, cordate, firm and hard when full-grown, rough, with raised groups of cystolith-cells. Blade 5-7in.; petiole 2-3in. long, the basal as well as secondary and transverse tertiary nerves prominent on the underside of mature leaves. Flowers white, middle-sized, nearly sessile, in lateral, compact, shortly pedunculate or nearly sessile cymes. Calyx turbinate, $\frac{1}{3}$ in. long. Corolla-lobes spathulate, spreading or reflected. Male flowers with rudimentary ovary, but without style or stigma. Stamens, usually 6, exserted, filaments hairy at the base, anthers of male flowers large. Drupe $\frac{1}{2}$ - $\frac{3}{4}$ in. long, ovoid acute; not edible.

Use:—The Santals use the bark medicinally in jaundice. (Revd. A. Campbell).

815. *Ehretia obtusifolia*, Hochst. H.F.B.I., IV.
142.

Vern:—Chamror (Punjab plains); Gin. (Ravi); Chamar (Bias.); Sakkur, dhaman, saggar, gangar, bari kander (Salt Range); Chambal (Sind Sagar Doab). (Pb.). Maraghune, kharawune, khabarra, tutiri, lor (Pushtu).

Habitat:—Scinde, Punjab; in the Salt Range. Rajputana, Ajmere, Merwara.

A small shrub. Bark grey. Wood greyish or brownish-white, moderately hard, even-grained. Branches grey. Leaves rough, quite entire and hairy, obovate or spathulate, ovate-oblong,

much cuneate at base; blade 1-2 in., narrowed into a petiole, $\frac{1}{4}$ in. long. Flowers white or blue, in lax hairy cymes. Corolla-tube twice the length of Calyx; lobes as long as tube.

Use.:—A decoction of the fresh root is used in venereal diseases (Dymock).

816. *E. buxifolia*, Roxb. H.F.B.I., IV. 144; Roxb. 201.

Vern.:—Cooruvingie, voyr (Tam.); Bapana-búri (Tel.); Paleke-jurr (Dec.); Pálé (H.); Pálâ (M.).

Habitat.:—Deccan Peninsula, in dry jungles.

A shrub, with stiff branches. Leaves $\frac{1}{2}$ -1 in., fasciculate on arrested branchlets, oblanceolate, apex, with a few obtuse teeth, pale beneath, upper side rough, with short stiff hairs standing generally on white disks (cystolith-cells), entire or often 3-lobed at apex, obtuse, attenuated base, subsessile. Peduncles $0-\frac{3}{4}$ in., hairy, axillary, 1-(or few)-flowered. Flowers, says Brandis, "solitary or a few together on slender hair peduncles." Calyx hairy; lobes $\frac{1}{3}$ in., lanceolate, linear, spathulate, longer than tube. Corolla $\frac{1}{4}-\frac{1}{2}$ in. across, white, campanulate; lobes short, ovate. Filaments very short. Style 2-fid to near the base, or two distinct styles. Drupe globose, $\frac{1}{4}-\frac{1}{2}$ in. diam., yellow or scarlet when ripe. Stone one, 4-celled (Brandis).

Use.:—The root is employed in Southern India by the Hindoo doctors as an alterative, and by the Mahomedan as an antidote to vegetable poison (Ainslie).

Dr. A. E. Ross reports having employed it in the form of decoction, in proportion of two ounces of the root to a pint of water, and that this in doses of two ounces appeared to be decidedly beneficial in secondary and constitutional syphilitic affections (Ph. Ind.).

817. *Coldenia procumbens*, Linn., H.F.B.I., IV. 144; Roxb. 150.

Sans.:—Tripakshi.

Vern.:—Tirpungkhi, triphunkhi, tripungki (H.); Bursha (Sind.); Tripakshi (Bomb.); Seru-padi, siru-padi (Tam.); Hamsa-padu, hama-padi (Tel.).

Habitat :—A weed common throughout tropical India.

A procumbent, scabrous, hairy annual herb, usually quite flat. Leaves alternate, crisped, elliptic-obovate, coarsely serrate or subpinnatifid, 1-1½ in. Flowers axillary, sessile or nearly so, ½ in., the upper sometimes in a leafy one-sided spike, yellow. Sepals 4 narrow, very hairy. Segments ⅓ in. long, ovate acute, ciliate. Corolla-tube short, lobes 4 imbricated in the bud, patent. Stamens 4 on the Corolla-tube; anthers ovate. Ovary 2-celled, with 2 ovules; style terminal, bifid. Drupe (nearly dry) of 4, subconnate, 1-seeded pyrenes. Pyrene ½ in. Testa of the seed thin. Seeds albuminous; cotyledons flat.

Uses :—As a medicine, equal parts of the dry plant and fenugreek seeds rubbed to a fine powder, and applied warm to boils, quickly brings them to suppuration (Ainslie).

The fresh leaves ground up are applied to rheumatic swellings (Murray).

818. *Heliotropium Eichwaldi*, Steud. H.F.B.I., IV. 149.

Syn. :—*H. europeum*, Benth.

Vern. :—Nil Kattei, bithúa, atwin, popat buti, gidar tamákú (Ph. and H.); Chirgas (Kash.)

Habitat :—Punjab and Scinde; in the plains frequent. Kashmir; Srinuggar Merwara.

An erect herb, with a woody stem. Branches from the base 6-12 in., softly closely hairy. Leaves ½-1½ in. obtuse, ovate, lower long-petioled, clothed on both sides with bulbous-based hairs, nerves not prominent on the upper surface; petiole ⅓-1 in. Flowers 2-ranked. Spikes dense, ebracteate, 2 in. Calyx deciduous with the fruit, 5-parotite. Sepals ⅓ in., ovate-lanceolate, hairy. Corolla-tube ⅓ in., narrow, cylindric, hairy without; segments round, crenulate. Style very short. Stigma with a broad based conical appendage bifid at the apex, stigmatic ring not conspicuous. Nutlets ⅓ in, glabrous, minutely verrucose.

Part used :—The leaf.

Uses :—The plant is emetic, and also given after snake-bite, and, along with tobacco-oil, is applied locally to the bite itself (Stewart).

The leaves boiled in a little castor oil, said to relieve pain of scorpion bite or bee-stings, also the bite of mad-dogs. For cleansing and healing ulcers also of service (Murray, 171).

819. *H. undulatum*, Vahl. H.F.B.I., IV. 150.

Vern.:—Pipat-buti; Jate misák (Pb.).

Habitat:—Frequent in the Punjab, Scinde and Upper Gangetic Plain.

Sub-erect, 6-24 in., branched, harsh, scabrous, Leaves $\frac{1}{2}$ -1 $\frac{1}{2}$ in., often rugose, obscurely petioled, lanceolate, bristly, margins crenulate. Spikes rigid, branches short. Flowers sessile, ebracteate. Sepals $\frac{1}{6}$ in., oblong, scabrous, rigid, persistent, after the nutlets have fallen. Corolla-tube $\frac{3}{8}$ in., tubular, scabrous without; lobes very small, ovate. Nutlets 4, $\frac{1}{2}$ in., verrucose, hispid or bristly.

Use:—Given after snake-bite, while tobacco-oil is locally applied to the bite itself (Stewart).

820. *H. strigosum*; Willd., H.F.B.I., IV. 151.

Habitat:—Throughout India.

Herbs usually procumbent, intricately branched. Leaves $\frac{3}{4}$ by $\frac{1}{10}$ in., small, linear-lanceolate. Spikes mostly elongate. Upper flowers, sessile, not conspicuously bracteate; lower flowers of the spike often pedicelled, with larger bracts. Sepals $\frac{1}{2}$ in. ovate-lanceolate. Corolla tubular, throat not hairy. Stamens 5, on the Corolla-tube included, filaments very short. Stigma ovate, linear. Fruit $\frac{1}{8}$ - $\frac{1}{2}$ in., long and broad; ovoid, not or obscurely 4-lobed, with minute grey hairs, depressed conical at apex.

821. *H. brevifolium*, Wall., H.F.B.I., IV. 151.
(Reduced to a Var. of *H. strigosum* in Hooker's *Fl. Br. Ind.*)

Vern.:—Safed-bhangra, Chiti phúl (H.); Kharai, Tindu, Gorakh pámo (Pb.).

Habitat:—Throughout India, even more abundant than *H. strigosum* type.

Differs from *H. strigosum* by its shorter leaves. Leaves $\frac{1}{4}$ by $\frac{1}{12}$ in., narrowly lanceolate.

Uses:—Both *H. strigosum* and *H. brevifolium* are laxative and diuretic, their juice is used as an application to sore-eyes, gum-boils and sores generally, to promote suppuration, and as a cure for the sting of nettles and insects

822. *H. indicum*, *Linn.*, H.F.B.I., IV. 152; Roxb. 152.

Sans.:—Hatisunadá, srihastini, bhurundi.

Vern:—Hatta-jurie, hatta-súra, siriari (H.); Hátisurá (Uriya and B.); Chappu-tattu (C. P.); Bhurundi (Mar.); Háthi-Sundhâna (Guz) Tet-Kodduki (Tam). Telu-munnie, Nagadanti (Tel); Tel-Kotukka, Teliyanui (Mal).

Habitat:—Throughout India; very common in the moister parts.

A coarse, diffuse, hairy annual, $\frac{1}{2}$ -2 ft. high. Stem stout and somewhat succulent but woody at the base; branches ascending, clothed with stiff spreading hairs. Leaves alternate or sub-opposite, petioled, 1-4 in. long, ovate or ovate-oblong, obtuse or subacute, sparsely hairy above, minutely pilose beneath, margins undulate or suberrate, base rounded or cordate or decurrent into the petiole, nerves prominent beneath. Spikes 2-6 in. long, usually extra-axillary, simple or forked, ebracteate hispid. Flowers pale-violet, sessile, 2-ranked. Calyx 5-partite, $\frac{1}{10}$ in. long, sparsely bristly outside; segments unequal, narrowly lanceolate, acute. Corolla funnel-shaped, $\frac{1}{2}$ in. long, hairy outside, tube slender, cylindric, slightly dilated at the base; lobes very small, rounded, reflexed, Stigma shorter than the style, with an annular frill at the base; apex short, obtuse. Fruit $\frac{1}{2}$ in. long, deeply 2-lobed, each lobe bluntly 4-ribbed, containing 2 angular beaked 1-Seed seeded pyrenes, each with an empty cavity on the inner side. White, subquadrate. (Duthie).

Uses:—The leaves of this widely-distributed plant are held in esteem in various parts of the world as an external application to ulcers, wounds and local inflammations. Their action is probably only that of an emollient. Diuretic properties are also assigned to the plant (Ph. Ind.).

In Patna, the leaves are employed in cases of fever, the dose given being from half a drachm to 3 drachms (Irvine).

"Considered by natives of Porto Rico to be an excellent remedy for all kinds of ulcers. But it has a far greater reputation for the cure of sore throat. In many cases of pharyngitis and tonsillitis, I have obtained relief of the pain and constriction attending those diseases, by repeating gargles with a decoction of the leaves and flowers of the plant, giving internally one wine glass of the same every 2 hours" (Dr. Amedo, in the Ph. J. for April 23, 1888).

Chemical composition.—The stems and leaves, besides containing a tannin soluble in ether, affording a dirty green coloration with ferric chloride, and an organic acid, non-crystalline, also soluble in ether, gave very marked evidence of the presence of an alkaloidal principle soluble in ether, and yielding marked precipitates with the ordinary alkaloidal reagents: with potassic chromate it afforded no precipitate, and it gave no special colour reactions. It was tasteless.

823. *Trichodesma indicum*, Br. H.F.B.I., IV. 153.

Syn.:—*Borago indica*, Linn., Roxb. 154.

Vern.:—Chhota-kulphâ (H. and B.); Kowri-bootee, Katmandoo (Pb.); Gâozabân (Sind.); Hetmudia (Santal); Katmandi (Kumaon); Ratisurkh, nilakrái (Kashmir); Lahána kalpa (Mar.); Kazuthai-tumbai (Tam.); Gusva-gutti (Tel.).

Habitat:—Common throughout India; not in Bengal Plains.

Parts used:—The leaves; root.

Erect or diffuse herbs, bristly, with hairs springing from tubercles, and also more or less villous. Stems erect or diffuse, up to 18 in. long. Leaves opposite, upper alternate, entire, 1-4 in., tuberculate on the upper surface, mostly sessile, lanceolate or cordate-lanceolate. Lower pedicels often distinctly axillary, 1-flowered. Flowers pale blue, changing to pink or white. Calyx-lobes $\frac{1}{3}$ - $\frac{1}{2}$ in., more or less grey or white villous (at least in fruit), cordate or hastate at the base. Corolla-tube $\frac{1}{4}$ in., lobes $\frac{1}{2}$ in., ovate, suddenly acuminate; Staminal one densely closely woolly on the back. Fruit ellipsoid. Nutlets $\frac{1}{8}$ in., sometimes very rough on the inner surface, obscurely margined, white or bluish when ripe.

Uses :—Held in repute in snakebites; also considered diuretic. A cold infusion of the leaves is considered depurative. In the Deccan, the plant is used as an emollient poultice (Watt).

In Chutia Nagpur, the root pounded and made into a paste, is applied to reduce swellings, particularly of the joints (Revd. A. Campbell).

824. *T. africanum*, Br. H.F.B.I., IV. 154.

Vern. :—Paburpanee (Sind.)

Habitat :—Punjab and Scinde.

Stem and leaves as of *T. indicum*, but more harshly hispid, bristly, with hairs springing from the tubercles. Leaves ovate-oblong, lower long-petioled. Racemes mostly lateral, often bipartite and subbracteate. Calyx-lobes $\frac{1}{4}$ in.; in fruit cordate at the base, $\frac{1}{2}$ – $\frac{2}{3}$ in. Corolla-tube $\frac{1}{2}$ in., lobes $\frac{1}{4}$ in., ovate, acute. Staminal cone laxly hairy at the back. Nutlets $\frac{1}{4}$ in., margin prominent, glochidiolate.

Uses :—Leaves are used as diuretic (Murray).

825. *T. zeylanicum*, Br. H.F.B.I., IV. 154.

Vern. :—Hetenuria (H.); Tirup-sing (Mandariy).

Habitat :—Bundelkhand. From Chota Nagpur and Bombay to S. India and Ceylon.

An erect annual, 1-2 ft. high. Stems stout, densely pilose, often tinged with purple. Leaves sessile or shortly petioled, 2-4 in. long, lanceolate or oblong, obtuse or acute, upper surface covered with short stiff, bulbous based hairs, finely pubescent beneath. Flowers pale-blue, usually in terminal bracteate panicles, or with a few solitary ones in the upper axils; pedicels slender pubescent nodding; bracts leaf-like. Calyx softly pubescent, rounded at the base; lobes $\frac{1}{2}$ in. long; lanceolate, acute, hairy within, midrib prominent. Corolla-tube $\frac{1}{2}$ in. long; lobes obovate, rounded, plicate, with a spirally twisted acuminate apex. Nutlets grey when ripe, otherwise resembling those of *T. indicum*. (Duthie).

Use :—Leaves used as an emollient poultice (Watt).

826. *Macrotomia Benthani*. Dc., H.F.B.I., IV. 177.

Vern. :—Gãozabân (Pb.).

Habitat :—Western Himalaya, from Kumaon to Kashmir.

Erect, hispid, perennial herbs, tall, simple, stem 1-3ft. Radical leaves 11 by $\frac{1}{2}$ in. by $\frac{1}{2}$ in. Cauline leaves 3 by $\frac{1}{2}$ in.; acute; narrow lanceolate. Spike, terminal, solitary, 12 by 2-3 in., usually very dense. Flowers purple; sepals 1-1 $\frac{1}{2}$ in., linear. Corolla-tube $\frac{2}{3}$ in., mouth $\frac{1}{4}$ - $\frac{1}{3}$ in. diam. Style shortly bifid; stigmas 2, capitate. Nutlets $\frac{1}{8}$ in., ovoid, suddenly acute, nearly as broad as long.

Use :—The plant is considered useful in diseases of the tongue and throat (Stewart).

827. *M. perennis*, Boiss. H.F.B.I., IV. 177.

Habitat :—Alpine Western Himalaya, from the Karakorum and Kashmir to Kumaon.

Herbs, with perennial roots. Stem solitary or several, undivided or hirsute. Cauline leaves 1-2 in., sessile. Cymes compound, 3-4 in. diam., spikes short, many-flowered or subcapitate. Sepals $\frac{1}{3}$ - $\frac{1}{2}$ in., lanceolate-linear, sepals in flower, says C. B. Clarke, $\frac{1}{3}$ - $\frac{1}{2}$ in. patently hirsute; in fruit sometimes nearly 1 in., and sublanceolate. Corolla purple, tube as long as the sepals in flower, or exceeding them by $\frac{1}{10}$ - $\frac{1}{5}$ in., lobes $\frac{1}{8}$ in., varying in breadth. Flowers dimorphic, one form having $\frac{1}{2}$ -exserted anthers and short, 2-lobed stigmas, the other with included anthers between the capitate stigmas. Nutlets nearly as in *M. Benthami*, but larger (C. B. Clarke).

Uses :—The bruised roots of this plant are applied to eruptions, and, along with *Onosma echioides* and one or two other roots, constitutes the *Ruttanjot* of the Punjab and the North-West Himalayas. In Afghanistan, it is used to relieve tooth-ache and ear-ache (Aitchison).

828. *Onosma echioides*, Linn. H.F.B.I. IV. 178.

Vern. :—Ratanjot (H.); Newar, maharangi (Nepal); Ratanjot, maharanga, láljari, koame (Pb.).

Habitat :—Kashmir and Kumaon.

A biennial, patently hispid, herb. Stem 8-10 in. Cauline leaves 2 $\frac{1}{2}$ by $\frac{1}{2}$ in. oblong. Racemes elongate, often forked, in

fruit 1-6in., bracts $\frac{1}{2}$ -1in., leaflike ; pedicels 0- $\frac{1}{2}$ in. Calyx-lobes $\frac{1}{2}$ in., narrowly oblong, in fruit sometimes attaining 1 inch, much longer than the tube. Corolla $\frac{3}{4}$ in., cylindric, tube somewhat dilated upward, yellow, $\frac{1}{4}$ in. diam. at top, glabrous without. Filaments linear, not dilated at base, anthers included, or shortly exserted. Style overtopping the anthers. Nutlets $\frac{1}{2}$ - $\frac{3}{4}$ in. long, stony, white, shining smooth, often speckled.

Uses :—The bruised root is used as an application to eruptions. The leaves possess alterative properties, and the flowers are prescribed as a cordial and stimulant in rheumatism and palpitation of the heart (Stewart).

829. *O. bracteatum*, Wall. H.F.B.I., IV. 178.

Vern :—Gãozabân.

Habitat :—Western Himalaya ; Kashmir, Kumaon, and Pindari.

Hirsute herbs. Stems 15in., erect, stout, patently hispid. Radical leaves 6 by 1in., petioled ; cauline 2 by $\frac{2}{3}$ in., acuminate, upper surface hispid, with tubercular based hairs ; lower leaves lanceolate, upper ovate-lanceolate, silky white beneath. Racemes capitate. Flowers in dense silky heads 2-3in. diam. Calyx-lobes in fruit lin., linear silky. Corolla-tube $\frac{1}{2}$ in. long $\frac{1}{6}$ in. diam. at the mouth, hairy without, a ring of hairs at the base within. Anthers included, filaments linear. Nutlets ovoid, rough, $\frac{1}{6}$ in. acute.

Use :—It is esteemed by the native practitioners as tonic and alterative, and is much prescribed as a decoction in rheumatism, syphilis and leprosy, (S. Arjun).

It is a good refrigerant and demulcent, few medicines are equal to it for relieving the excessive thirst and restlessness in febrile excitement. It is also of great service in relieving functional palpitation of the heart, irritation of the stomach and bladder, and strangury. It is used in the form of an infusion prepared with either cold or hot water, in the proportion of 1 to 20. Dose $\bar{\text{z}}$ ii to $\bar{\text{z}}$ iv frequently, or *ad libitum* (Moodeen Sheriff).

N. O. CONVULVULACEÆ.

830. *Erycibe paniculata*, Roxb. H.F.B.I., IV. 180
Roxb. 197.

Vern.:—Urumin (Kol); Kari (Santal). Ankole, Sengarbally (K).

Habitat:—Throughout India.

A diffuse or subscandent shrub, or an erect tree, 40ft. Bark brown, with large rough corky lenticels. Wood soft, porous, of peculiar structure; round the central pith radiate in series of wedges of wood tissue; round these comes a layer of bast tissue; then a series of separate, round, concentrically arranged masses of wood tissue separated by bast tissue, then more layers of bast and similar masses of wood tissue, gradually getting smaller outwards (Gamble). Branchlets angular. Young shoots and inflorescence densely clothed with rust-coloured tomentum. Leaves 5 by 2in., obovate or obovate-oblong, abruptly acuminate, glabrescent, base attenuate, nerves 5-7 pair, distinct above. Petiole $\frac{1}{2}$ in. long. Flowers yellowish-white, in elongate narrow terminal panicles, 7 by 1 $\frac{1}{2}$ in. Bracts inconspicuous; pedicels $\frac{1}{8}$ - $\frac{1}{6}$ in. Calyx clothed outside with reddish-brown tomentum and more or less stellate-pubescent. Sepals $\frac{1}{10}$ in. Corolla $\frac{1}{2}$ - $\frac{3}{4}$ in., petals crisped, tube broadly funnelshaped; lobes 5, bifid, hairy on the back below the division, margins plicate. Anthers with a long curved apiculate connective. Berry $\frac{1}{2}$ in. diam., when ripe, black, ellipsoid, supported by the rusty-pubescent 5-lobed calyx.

Use:—In Chutia Nagpur, the bark is given for cholera (Revd. A. Campbell).

831. *Rivea ornata*, Chois, H.F.B.I., iv., p. 183.

Vern.—Phând (Mar.)

A large spreading shrub. Stems subherbaceous, hardly ever twinning. Leaves 3-6 in. long, usually broader than long, orbicular or reniform, obtuse, somewhat emarginate and often apiculate at the apex, rather silky beneath, lobes rounded; petioles

shorter than the leaves, with a greenish gland on either side of the apex. Peduncles as long as the petioles, usually 7-flowered, bracts lanceolate. Flowers white, fragrant. Sepals about $\frac{3}{4}$ in. long, ovate-lanceolate, acute, thick, silky-hairy outside, persistent. Corolla-tube 2-3 in. long, limb about 2-2 $\frac{1}{2}$ in. in diam. Berry oblong, pointed, 1 celled. Seeds usually solitary.

The flowers open at sunset and wither on the following morning. The so called *R. ornata* of S. India is a separate species. A more correct name for this plant of N. India would be *R. Roxburghii*, Prain. (See Prain in Nov. Ind. viii, 89. (Duthie).

Habitat.—India, from Assam to Belgaum and Mysore. Frequent in Bengal plain.

Uses.—In the Concan, the juice is made with Borneo camphor and butter into an ointment for pityriasis. For piles, one tolâ of the juice, with half a tolâ of Babul pods, and a little sugar, is given in a quarter seer of cow's milk every morning (Pharmacographia Indica, Vol. II., p. 541).

832. *Argyreia speciosa*, Sweet. H.F.B.I., IV. 185.

Syn.:—*Lettsonia nervosa*, Roxb. 164.

Sans.:—Samudra palaka; Vriddha-daruka.

Vern.:—Samandar-ká-pat; Samandar-phen (Hind.); Bich-taraka (Beng.); Kaf-darya (Pers.); Shamuddi rap-pachchai, (Tam.); Samudra shoka (Bomb.); Samudra-pála (Tel); Samandar-ká-patta (Dec.); Samandar-sôf; Samandar-sokh (H.); Guguli (B.); Kedok arak (Santal); Shamuddirap-pachchai (Tam.); Chandra-poda, kokkita, pála-samudra (Tel); Samudra-pach-cha, samudra-zogam, samudra-pala (Mal.).

Habitat:—India, from Assam to Belgaum and Mysore; frequent in Bengal plains.

A shrub, with a stem climbing, not twining, rather stout, cylindric, fine silky pubescent, with white adpressed hairs. Branchlets stout, white tomentose. Leaves 1 $\frac{1}{2}$ -3 in., broadly ovate or reniform, cordate at base, very shortly acuminate, apiculate, glabrous above, more or less densely white, silky

beneath (Trimen). 3-5in. diam., often broader than long, glabrous above, and, sometimes at length beneath (C. B. Clarke). Petioles 1-2in., densely silky peduncles, mostly 3-fid, $\frac{1}{2}$ in. or less. "pedicels articulated to a stiff stout peduncle 1-3in long" (Trimen). Bracts oblong acute, fleshy, caducous. Buds pointed silky at tip, sepals $\frac{1}{2}$ - $\frac{3}{4}$ in., ovate subacute, fleshy, silky pubescent outside. Corolla-tube $1\frac{1}{2}$ -2in., narrow limb, white silky, without, $2\frac{1}{2}$ -3 $\frac{1}{2}$ in. diam., lobes shallow marginate. Ovary glabrous, stigmas blunt. Fruit nearly globose, under lin., apiculate, smooth, shining, pale brown.

Flowers deliciously sweet-scented, first white, becoming pale cream-coloured. A beautiful plant, flowering at night (Trimen).

Uses:—In Hindoo medicine, the root is regarded as alterative, tonic and useful in rheumatic affections and diseases of the nervous system (Dutt).

The leaves are maturative and absorptive, and are used as emollient poultices for wounds, and externally in skin diseases. In synovitis, the powdered root is given with milk. Mixed with vinegar, the sap is rubbed over the body to reduce obesity (Watt).

The natives use the leaves as a local stimulant and rubefacient. According to Dr. Wight, they act as a powerful vesicant (Ph. Ind.). "With regard to the alleged blistering properties of the upper surface of the leaf there must be some mistake, as we find it has no effect when applied to the skin." (Pharmacographia Indica, Vol. II. p. 541).

The roots yielded acid resins of an amber colour, soluble in ether and benzole, and partly soluble in alkalies. The acid ether extract was partly soluble in water with strong acid reaction, and gave with ferric salts a grass-green coloration; with alkalies a bright yellow. The portion insoluble in water was soluble in alkalies with orange coloration, and afforded with acids a yellowish white precipitate. The original aqueous solution after addition of an alkali and agitation with ether, failed to afford any alkaloidal reactions when the ethereal extract was tested. This extract did not amount to more than a trace. The original aqueous solution contained a tannin-like principle. (Pharmacographia Indica, II. 542).

833. *Ipomœa bona-nox*, Linn. H.F.B.I., IV.

197.

Sans.:—Pathemapu-todami.

Vern.:—Dudiya-kulmi, Kalmilata; Ilalkalmi (Beng.); Gulchandni (Bomb.); Naga-mûghatei (Tam.); Mundavalli (Mal.); Nagara-mûkuttykai (Tel.); Somavel, banya bauri, chandra Kânt (H.).

Eng.:—Moon flower.

Habitat:—Cultivated throughout India, native of tropical America.

An extensive climber. Stems smooth or not, rarely muricate. Leaves cordate-ovate, acute, glabrous, entire or angular or lobed, 3-8 in. Petiole 3-6 in. Peduncles 2-6 in. long, 1-5-flowered; bracts caducous. Flowering sepals ovate, obtuse mucronate, or shortly acute, rarely obtuse; in fruit unaltered, or enlarged. Corolla pure white, tube 3 by $\frac{3}{4}$ in., linear, many times longer than the sepals; limb 3-5 in. diam., with white or greenish plaits, never with at all purple. Stamens about as long as the Corolla-tube. Anthers shortly exerted or sub-included. Ovary 2-celled. Capsule one inch, ovoid-oblong, narrowed upwards; peduncle at length somewhat thickened. Seeds $\frac{1}{4}$ in. long, polished, yellow, glabrous.

The flower expands at night, closes to wither about one hour after sunrise.

Uses:—The capsules and seeds, as well as the flowers, leaves and roots are included amongst the medicines supposed to have some merit as remedies against snake-bite (Ainslie).

In Brazil, the seeds of *Ipomoea bonanox* are largely employed against snake-bits. The seeds have the following composition: Water, 9.00 p. c.; crystalline resin, 0.50 p. c.; amorphous bitter substance, 0.015 p. c.; carbohydrates, 17.28 p. c.; tannoids, 0.81 p. c.; fatty oil, 9.35 p. c.; resin acids, 1.25 p. c.; proteins, 2.70 p. c.; organic acids, 0.095 p. c.; ash, 5.00 p. c.

In the leaves of the plant is found a small quantity of a crystalline glucoside. [Peckolt Chemist and Druggist, 1910, quoted in J. Ch. Ind., Jan. 16, 1911, p. 46].

834. *I. muricata*, Jacq. H.F.B.I., IV. 197; Roxb. 167.

Vern.:—Bārikbbauri (Konkan); Gariya (Bomb.).

Habitat:—Himalaya, frequent from Kangra to Sikkim, Deccan hills; cultivated elsewhere.

A scandent glabrous herb. Stems rough, with small tuberculous out-growths. Leaves cordate-ovate, abruptly tapering into

a narrow point, acute glabrous, entire, 2-4in. Peduncles 1-5-fid, somewhat shorter than the petioles. Flowers large, pale-purple, in small stalked clusters, sometimes solitary. Sepals glabrous, broad, abruptly pointed. Flowering sepals elliptic-lanceolate; in fruit nearly as of *I. bona-nox*. Corolla funnel-shaped, tube 1-2 by $\frac{1}{2}$ in., narrowly cylindric, much longer than the Calyx, hairy within, stamens about as long as the Corolla-tube. Peduncle usually greatly thickened after fruit. Ovary 2-celled. Capsule $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., globose, apiculate. Seeds $\frac{3}{8}$ in. long, polished, black, glabrous.

Use :—The seeds are used chiefly as a substitute for those of *I. hederacea*. The medicinal properties seem to be the same as those of *Kâlâdana*, but accurate observations are required. The juice of the plant is used to destroy bugs (Dymock).

835. *I. Quamoclit*, Linn. H.F.B.I., IV. 199. Roxb. 169.

Sans. :—Kamalata; Turoolata.

Vern. :—Taru latâ, Lâl or swêta Kâmlatâ lâl or swet taru latâ (B.); Vishnukrant (Mar.); Kâmlatâ (H.); Tsjuriacrantî (Mal.); Ganesh-vel, Sita che kesh (Bomb.).

Habitat :—Native of tropical America, common throughout India, in gardens and as a denizen.

A slender, glabrous twiner. Leaves pinnate, segments distant, linear, 3-5 by 2-3in. Peduncles few-flowered. Sepals elliptic. Corolla crimson or white, middle-sized; tube narrow, 1in. long, mouth $\frac{1}{4}$ in. diam. Anthers exsert. Ovary 4-celled, $\frac{1}{4}$ in., ovoid, smooth; dissepiments thin, membranous, persistent. Seeds nearly glabrous, testa black.

Uses :—The Hindus consider it to have cooling properties. The pounded leaves are applied to bleeding piles, while a preparation of the juice with hot *ghi* is administered internally. In Bombay, the leaves are used as a *lep* for carbuncles (Dymock.)

836. *I. hederacea*, Jacq. H.F.B.I., IV. 199.

Syn. :—*I. Cœrulea*, Kæn. Roxb. 168. *Convolvulus Nil*, Linn.; *Pharbitis Nil*, Chois.

Vern. :—Nil-kulmi (B.); The seeds are sold as Kālā dānah; Mirchai (H. and B.); Kodi-kakkatan Virai (Tam.); Banura (U.-P.), Bildi, Ker, Kirpāwa, Phaprū-sag, Isbpecha (Pb.); Hub-ul-nil (Sind.); Kālī-zirki; Zirki (Dec.); Kālā dānā (Guz.); Kolli-vittulu (Tel.); Gauribija (Kan.).

Moodeen Sheriff says the Deccan name Kali-zirki should be exclusively applied to the seeds of this plant, but they have also caused great ambiguity by being applied to the seed of *Clitoria Ternatea*, *Linn.*

Habitat :—India; both cultivated and apparently wild.

Stem twining, sparsely, retrosely hirsute. Leaves 2-5 in. diam., ovate-cordate, 3-lobed; lobes ovate acuminate, petiole 1-4 in. Peduncle, 1-5-fid, mostly shorter than the petioles. Pedicels usually $\frac{1}{4}$ in.; bracts 2, $\frac{1}{3}$ in., linear, close to the Calyx. Sepals $\frac{1}{2}$ -1 in., subequal, narrowly linear upwards, very hirsute, or nearly. Corolla-tube narrow. $1\frac{1}{2}$ -2 in., funnel-shaped, rose-coloured, or somewhat orange below. Anthers included, never twisted. Ovary 3-celled, 6-ovuled. Capsule 3-celled; $\frac{1}{3}$ in., ovoid, subglobose smooth. Seeds 4-6, glabrous (C. B. Clarke).

Uses.—The author of the *Makhzan-ul-Adwiya* says that this drug is a drastic purgative, useful in the treatment of bilious and phlegmatic humours, and that it acts also as an anthelmintic. Roxburgh was the first to make these seeds known to European physicians, and it may be said they now hold an important position as a useful and cheap substitute for jalap. They were made officinal in the *Pharm. India* in 1868, in which will be found directions to prepare the forms in which the drug is now administered, namely: in the form of a tincture, an extract, a compound powder, or a resin, supplying the place of the corresponding preparations of jalap. The resin appears to be the most satisfactory form of administering the medicine, the dose of which is 4 to 8 grains. This substance is known as Pharbitis.

“The powder of the seeds is very useful in Lepra, tuberculosa, &c. The infusion is demulcent” (London Exhibition, 1862).

The seeds yield 8 per cent. of resin, resembling the convolvulin of jalap tubers, and 14 per cent. of fat. The seeds are comparatively rich in albuminous substance, and the presence of a nauseous tasting fat is a disadvantage in a medicine administered internally, and interferes with the separation of the resinous active principle.

The authors of the *Parmacographia* say:—"By exhausting the seeds dried at 100° C. with boiling ether, we obtained a thick light-brownish oil having an acrid taste and concreting below 18° C. The powdered seeds yielded of this oil 14.4 per cent. Water removes from the seeds a considerable amount of mucilage, some albuminous matter, and a little tannic acid. The first is soluble to some extent in dilute spirit of wine, and may be precipitated therefrom by an alcoholic solution of acetate of lead.

"The active principle of Kaladana is a resin, soluble in alcohol, but neither in benzol nor in ether. From the residue of the seeds after exhaustion by ether, treatment with absolute alcohol removed a pale yellowish resin in quantity equivalent to 8.2 per cent. of the seed. Kaladana resin, which has been introduced into medical practice in India under the name of *Pharbitisin*, has a nauseous acrid taste and an unpleasant odour, especially when heated. It melts at about 160° C. The following liquids dissolve it more or less freely, namely, spirit of wine, absolute alcohol, acetic acid, glacial acetic acid, acetone, acetic ether, methylic and amyl alcohol, and alkaline solutions. It is, on the other hand, insoluble in ether, benzol, chloroform, and sulphide of carbon. With concentrated sulphuric acid, it forms a brownish yellow solution, quickly assuming a violet hue. This reaction, however, requires, a very small quantity of the powdered resin. If a solution of the resin in ammonia after having been kept a short time is acidulated, no precipitate is formed; but the solution is now capable of separating protoxide of copper from an alkaline solution of the tartrate, which originally it did not alter. Heated with nitric acid, the resin affords *sebacic acid*.

"From these reactions of Kaladana resin, we are entitled to infer that it agrees with the resin of jalap or *Convolvulin*. To prepare it in quantity, it would probably be best to treat the seeds with common acetic acid, and to precipitate it by neutralising the solution. We have ascertained that the resin is not decomposed when digested with glacial acetic acid at 100° C., even for a week.

"We have had the opportunity of examining a sample of Kaladana resin manufactured by Messrs. Rogers and Co., Chemists of Bombay and Poona, which we found to agree with that prepared by ourselves. It is a light yellowish friable mass, resembling purified jalap resin, and, like it, capable of being perfectly decolourised by treatment with animal charcoal." (*Op. cit.*, 2nd Ed., p. 449.)

837. *I. uniflora*, Roem and Sch., H.F.B.I., IV. 201.

Habitat:—Throught India, from Nepal and Khasia to Ceylon; not common, more frequent in the Deccan Peninsula.

A glabrescent twining herb with creeping stems. Leaves petioled, oblong, obtuse, entire. Peduncles axillary, 1-flowered. Outer sepals larger than the inner and decurrent on the pedicel. Corolla white, campanulate, hairy on the bands outside. Ovary

2-celled; stigmas 2, capitate. Capsule 4-valved. Seeds 4, with a fringe of hair round the margin (Duthie).

Uses:—It is purgative, and the juice is administered in bilious dyspepsia.

838. *I. digitata*, Linn. H.F.B.I., IV. 202.

Syn.:—*Convolvulus paniculatus*, Linn. Roxb. 160; *I. paniculata*, Br.

Sans.:—Vidari and Bhumikushmānda.

Vern.:—Bilal-kand, bhūmi-kūmra, bhūi-kumra (Beng.); Bhui-kohalā (Bom.); Bhummichekri-gadde (Kan.); Mattapal-tiga (Tel.); Phal-modecca (Mal.).

Habitat:—Tropical India; common from Bengal and Assam to Ceylon; not in the drier western portion. Vengrula; Thana district.

A large, scandent, perennial, glabrous shrub. Leaves 3-7 in. diam., often lobed nearly to the base, large palmately 5-7-lobed, peduncle many-fid, longer than the petioles; lobes lanceolate or elliptic, often spathulate; petioles 2-5 in.; peduncle often 6 in.; bracts deciduous. Flowers not capitate. Sepals $\frac{1}{4}$ - $\frac{1}{3}$ in.; wider concave in fruit, elliptic shortly acute, glabrous. Corolla $1\frac{1}{2}$ -2 in., widely campanulate, glabrous, pink-purple. Anthers never twisted. Ovary completely 4-celled, unless perhaps near the top. Capsule $\frac{1}{3}$ in., ovoid, completely 4-celled to the apex, 4-valved, the long wool from the seeds exsert from the fissure. Wool hairs, $\frac{1}{4}$ in. long.

Uses:—The large tuberous roots are very much used in native medicine, being regarded as tonic, alterative, aphrodisiac, demulcent, and lactagogue. The powdered root-stock is given with wine, for the purpose of increasing secretion of milk.

According to the author of the *Makhzan-ul-Adwiya*, they are tonic and alterative.

The Rev. J. Long says the powdered root is used in spleen disease; it is purgative in its action.

Cholagogue, useful in liver complaints (J. N. Dey, in Watt's Dictionary).

The fresh tuber, collected in November when the vine had died away, was sliced, dried at a low temperature and reduced to fine powder. The

powder dried 100°C., yielded 2.68 per cent. of extractive to absolute alcohol of which 1.73 per cent. was soluble in ether. The resins contained in the alcoholic extract had the properties of Jalap resins as regards colour, reactions, &c.; but we are unable to say whether they possess any purgative action. Sugar, reducing alkaline copper solution on boiling, was present to the extent of 10.909 per cent. calculated on the anhydrous tubers. The bulk of the tuber consists of starch. Supposing the resins to be purgative, they are present in so small a proportion that no ordinary dose of the root would have any aperient action. (*Pharmacographia Indica*, Vol. II p. 536).

839. *I. Batatas*, Lamk. H.F.B.I., IV. 202.

Syn.:—*Convolvulus Batatas*, Linn. Roxb. 162.

Vern.:—Shakarkand; Rângâ âlu (B.); Shakarkand (H. and Pers.); Vulli-kiz-hangu (Tam.); Ratâlu, Shakar-kand (Bomb.); Sakaria (Guz.); Chelagada (Tel.) Genasu (Kan.).

Habitat:—Native of America, cultivated in India.

Prostrate annual herbs, glabrous or sparingly hairy. Tubers red, white or rarely yellow. Leaves ovate-cordate, many-fid. Acute angular, more or less lobed, Peduncles long. Flower 2in. and upwards, purple. Sepals elliptic, shortly acute, glabrous. Corolla widely tubular, funnel-shaped. Stamens included. Ovary 4-celled. Seeds glabrous. Rarely allowed to grow to the stage of fruiting or even flowering. The edible mealy tubers are gathered for the market long before that.

There are two forms, one with red and the other with tubers!

Use:—The roots of this plant have a laxative property. (Watt).

It contains more dry starchy and sugary matter than the ordinary potato, but less nitrogenous substance possessing about 10 to 20 per cent. of sugar and about 16.05 per cent. of starch. It is an excellent source of alcohol, 100 kilos of tubers yielding about 12 to 13 litres of absolute alcohol.

840. *I. pes-tigridis*, Linn. H.F.B.I. IV. 204; Roxb. 169.

Vern.:—Languli-latâ (B.); Mekamu aduga (Tel.).

Habitat:—Throughout India.

Stems twining, patently hirsute. Leaves 1-5in. diam., hirsute on both surfaces, deeply 5-9-lobed. Lobes elliptic, acuminate, narrowed at the base; petiole 1-3in. Peduncles ½-3in. Heads

peduncled, dense, fulvous-hirsute; outer bracts 1 in., ovate or elliptic-oblong, not cordate; inner bracts smaller, narrower, acute. Sepals $\frac{1}{3}$ - $\frac{1}{2}$ in.; lanceolate, acute, hirsute, enlarged in fruit. Corolla pink, medium-size, funnel-shaped, $1\frac{1}{4}$ in., tube narrow, mouth suddenly widened, sparsely hairy without. Stamens included. Ovary 2-celled, 4-ovuled, rarely imperfectly 4-celled near the base. Capsule $\frac{1}{4}$ in., ovoid, papery, glabrous. Seeds minutely velvety or nearly glabrous. 4-2, rarely 1.

Use:—Said to be used medicinally (Watt).

841. *I. reniformis*, Chois. H.F.B.I., IV. 206; Roxb. 161 (UNDER CONV. RENIFORMIS).

Vern.:—Undirkáni (Bomb.); Perretoy kiray (Tam); Toinvatali (Tel.).

Habitat:—Deccan peninsula, common, extending northwards to Rajputana and Behar.

Closely creeping, much-branched, often rooting from nearly every node, glabrous, or sparingly pubescent. Leaves small, reniform or ovate-cordate, toothed, $\frac{1}{2}$ - $1\frac{1}{2}$ in., often smaller, broader than long, occasionally 3-lobed; petiole $\frac{1}{4}$ -1 in. Peduncles 0 or very short, few-fid; 1-3 flowered; bracts inconspicuous. Sepals $\frac{1}{8}$ in., ovate-obtuse, glabrescent on the back, ciliate even in the fruit. Corolla small, yellow, $\frac{1}{2}$ - $\frac{3}{4}$ in., campanulate; lobes 5, acute. Capsule $\frac{1}{2}$ in., subglobose, 2-celled. Cell often 1-seeded. Seeds 2-4, glabrous, dark chestnut-coloured. "At a little distance the plant has the appearance of *Hydrocotyle asiatica*." (Pharmacographia Indica, Vol. II. p. 539).

Use:—The plant is described as deobstruent and diuretic, (S. Arjun).

The Hindus administer the juice in rat-bite, and drop it into the ear to cure sores in that organ. Its properties appear to be more fanciful than real, though, like others of the genus, it is purgative if taken in large doses (Dymock).

842. *I. obscura*, Ker. H.F.B.I., IV. 207.

Syn.:—*Convolvulus obscurus*, Linn. Roxb. 158.

Vern.:—Sirutali (Tam.); Tsinuataliaku (Tel.).

Habitat:—Throughout India and Ceylon.

Stems long, slender, twining, hairy or nearly glabrous, often tinged with purple. Leaves 1-2½ in., ovate-cordate, acute, entire, nearly glabrous. Petiole 1-3 in., peduncles long, laxly 3-fld, 1-3 in., often 1-flowered, rarely with 3-flowers. Bracts ½ in., lanceolate, sub-persistent; pedicels ¼-1½ in.; sepals ovate, sub-acute, nearly glabrous, ⅓ in., ultimately broader obtuse, reflexed. Corolla ¾-1 in., ochroleucous or white, with the plaits yellowish, always with a purple base; tube narrow, mouth wide, glabrous. Anthers never twisted. Capsule ¼-½ in., ovoid, subacute, glabrous, 2-valved, 2-seeded, normally 4-seeded. Seeds densely softly brown, velvety.

Uses:—The leaves have a pleasant smell and mucilaginous taste; when toasted, powdered and boiled with *ghi* they are considered as a valuable application in aphthous affections (Ainslie.)

843. *I. Sepiaria* Koen. H.F.B.I., IV. 209 Roxb. 168.

Habitat:—Throughout India.

A perennial herb, glabrous or more or less hairy. Stems slender, twining. Leaves 1-3 in. long, ovate, acute, entire, base cordate, with a wide sinus and rounded lobes, petioles 1-2 in. long. Flowers many, in umbelliform long-peduncled cymes, peduncles 1-6 in. long; bracts small, caducous, pedicels clavate in fruit. Sepals about ¼ in. long, ovate, glabrous or slightly hairy, margins membranous, 2 outer rather shorter than the inner. Corolla narrowly funnel-shaped, pink or white with a purplish centre, about 1½ in. long, or more, limb suddenly widened at the mouth; lobes acute, shortly apiculate. Filaments hairy at the base. Capsule ½ in. long, ovoid, glabrous. Seeds 4 or 2, clothed with grey silky hairs (Duthie).

Uses:—It has a reputation as an antidote to arsenic, the juice which is strongly acid, is said by Rheede to be used "*ad purificationum corporis*."

844. *I. aquatica*, Forsk. H.F.B.I., IV. 210; Roxb. 162.

Sans.:—Kalambi.

Vern.:—Kalmi-sák (B); Kalmi-ság, Nári (N.-W. P.);

Ganthian, Nári, Náli (Pb.); Naro (Sind.); Nálichí baji (Bomb.); Sarkarei valli; Koilangu (Tam.); Tuti-kúra (Tel.).

Habitat :—Common throughout India.

Annual, glabrous nearly so. Stems trailing on mud or floating on still or flowing water, sometimes to a great length, hollow. Leaves 3-6 in., elliptic-oblong, cordate or hastate or elongate, entire or angular, sublobed; petiole 1-6 in., usually very long. Peduncles 2-7 in., 1-5-flowered, bracts inconspicuous; pedicels often 1-2 in. long. Sepals ovate-obtuse, $\frac{1}{2}$ in., glabrous or nearly so. Corolla large purple, glabrous 2 in. Capsule $\frac{1}{2}$ in., ovoid, glabrous, 4-2-seeded. Seeds most minutely hairy silky or very nearly glabrous. (C. B. Clarke).

Use :—In Burma, the juice is said to be employed as an emetic in cases of arsenical or opium poisoning. The juice when dried is nearly equal to scammony in purgative efficacy (O'Shaughnessy).

845. *Campanulata*, Linn. H.F.B.I., IV. 211.

Habitat :—Deccan Peninsula, frequent.

A large twiner; nearly glabrous, young parts hoary. Leaves 3-4 in., nerves prominent; petiole 2-3 in. Peduncles 1-4 in., stout; bracts early deciduous; corymbs 2-5 in. diam., 10-40-flowered. Sepals hoary, in fruit somewhat enlarged $\frac{1}{2}$ in. diam. glabrate. Corolla very variable in size always prominently lobed, glabrous or nearly so. Capsule $\frac{1}{2}$ in. diam., globose, Seeds with hairs often more than $\frac{1}{2}$ in., long.

Use :—It is said to be an antidote to snake poison.

846. *I. Turpethum*, Br. H.F.B.I., IV. 212.

Syn. :—*Convolvulus Turpethum*, Roxb. 160.

Sans. :—Trivrit; Tripotá.

Vern. :—Nisoth, Tarbud, Nukpatar; Pitohari (H.); Teori, dudiya-kalmi (B.); Bana etka (Santal.); Chita baúsa (Pb.); Nishotar, Phút-kari (Bomb.); Nishottara (Mar.); Nashotar, Nahotara (Guz.); Tikuri (Dec.); Shivadai (Tam.); Tella tegada; Tegada (Tel.); Bilitigadu (Kan.).

Habitat :—Common throughout India.

A large, climbing, softly pubescent, or glabrous herb. Stem stout, quadrangular, winged, compressed or rarely round. and milky juice. Leaves 2-5in., ovate or oblong, not acuminate, base cordate or obtuse. Petiole 1-2in. Peduncles 1-4in., bracts 1in., oblong, caducous, often pinkish. Pedicles $\frac{1}{4}$ -1in. Cymes many-fid. Sepals $\frac{1}{2}$ in., usually softly pubescent; in fruit 1in., orbicular or ovate, concave, scarious or sub-succulent. Corolla white, largish, soon twisting. Capsule $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., globose, normally 4-seeded. Seeds smooth, black, one in each cell.

Uses:—Sanskrit writers describe two varieties, viz., *Sveta* or white, and *Krishna* or black. The white variety is preferred for medical use as a moderate mild cathartic. The black variety is said to be a powerful drastic and to cause vomiting, faintness and giddiness (Dutt).

Mahomedan physicians recognize two forms, a white and a black, and recommend that the black should be avoided on account of its poisonous properties.

The flowers are in Western India applied to the head in hemicrania (Dymock).

The *turpeth* root, notably the white variety of it, is quite equal to *jalap* and superior to *rhubarb* in its action, and preferable to both for having no nauseous smell or taste, and for being a very efficient and satisfactory purgative when used alone. Its dose is somewhat larger than that of *jalap*, but this is no disadvantage, as long as it is safe and free from nauseous taste and smell. The dose is larger only by 10 or 15 grains. As a cathartic and laxative, the *turpeth* root is useful in all the affections in which either *jalap* or *rhubarb* is indicated. The best way of administering it is in simple powder; but it may also be employed in combination with cream of tartar in equal proportion, and with or without a few grains of ginger in each drachm of the compound powder. Dose of the simple powder is from fifty to seventy grains, and of the compound powder from a drachm to ninety grains (Moodeen Sheriff).

About two scruples of the root are rubbed into a pulp with

water, and taken with the addition of rock salt and ginger or sugar and black pepper. Roxburgh wrote in his *Flora Indica* of this drug that "the bark of the root is by natives employed as a purgative, for which they use it fresh, rubbed up with milk. About 6 inches in length of a root, as thick as the little finger, they reckon a common dose."

Mr. T. N. Mukharji suggests that the uncertain action of the drug, purchased from the bazar, may be due to the admixture of the roots of *Ipomœa bona-nox*. The two roots, when dry, cannot be easily distinguished from each other. The plants, however, though resembling each other, can be easily identified. *I. bona-nox* has a round stem, while that of *I. Turpethum* is ribbed. The flowers and seeds of *I. bona-nox* are also larger than those of *I. Turpethum*.

Turpethin, $C_{76}H_{123}O_{36}$, the glucoside of the roots of *Ipomœa turpethum*, is an amorphous, yellow powder, colourless, in thin layers, and melts at 146.8° (corr); it has a rotatory power of -30.14° , and is sparingly soluble in chloroform, soluble in alcohol and acetic acid. When treated with alkalis, it yields turpethic acid, a yellow, hygroscopic mass. By oxidation with nitric acid, turpethin yields oxalic, isobutyric, and sebacic acids and carbonic anhydride, whilst potassium permanganate oxidises it to oxalic, isobutyric, and turpetholic acids. When hydrolysed with mineral acids, it yields isobutyric acid (1 mol.), turpethole, $C_{16}H_{30}O$ (? $C_{16}H_{30}O_3$), a substance forming feathery, interlaced crystals and melting at 85.76° (1 mol), glucose (3 mols.), and a viscid, liquid acid, which was not isolated, but gave a silver salt, $C_{15}H_{27}O_5Ag$.

Turpetholic acid, $C_{16}H_{32}O_4$ is obtained, as mentioned, and also by the action of alkalis or their carbonates on turpethole. It forms a hard, white, crystalline mass, melts at 88.4° , and is soluble in alcohol, sparingly soluble in ether; turpethole seems to be the anhydride of turpetholic acid.—J. Ch. S. 1893, A. I. 424.

Turpethin is identical with jalapin in percentage composition; when treated with baryta water, turpethic acid is formed, which is colourless and not volatile with steam.—J. Ch. S. 1896, A. I. 38.

The rhizome contains a glucosidal resin, named turpethin, soluble in pure ether. This is separable by light petroleum spirit into a soluble glucoside, *a*—turpethin, and a sparingly soluble body, *b*—turpethin. *a*—Turpethin is soluble in baryta water, and yields, when hydrolysed, the non-volatile fatty hydroxy-acid, $C_{16}H_{32}O_3$, identical or isomeric with jalapinic ipomeolic, and tampicolic acids. It also yields a volatile fatty acid of C_5 series, probably one of the valeric acids. The sugar formed is rhamnose. *b*—Turpethin, when hydrolysed, gives a non-volatile, higher fatty acid, rhodose, and dextrose.—[J Ch. I. May 31, 1907, p. 550].

847. I. *biloba*, Forsk H.F.B.I., IV. 212.

Syn.:—*Convolvulus Pes-Capræ*, Linn.; *C. bilobatus*, Roxb. 163.

Vern.:—Dopati-latâ (H.); Chhâgulkaru (B.); Marjâdvel (Bomb.); Bâlabândi tige, Chevulapilli tige (Tel.); Kansârinata (Uriya).

Habitat.:—Throughout India; abundant near the sea.

An extensively creeping and twining sea-shore sand plant, glabrous. Leaves orbicular, obtuse, emarginate, or 2-lobed 1-4in., often broader than long, fleshy, prominent-nerved; petiole 1-4in. Peduncle 1-4in. 1-3-fid; bracts $\frac{1}{2}$ in., lanceolate, caducous. Pedicels often more than one. Corolla 2in., purple, tubular, funnel-shaped, glabrous, margin scarcely lobed. Ovary 2-celled, not imperfectly 4-celled. Capsule $\frac{1}{2}$ in., ovoid, glabrous. Seeds villous.

Uses.:—The leaves are applied externally in rheumatism and colic. The root contains starch. The juice is given as a diuretic in dropsy and at the same time the bruised leaves are applied to the dropsical part. (Dymock.)

The powdered roots, dried at a low temperature, were exhausted with 80 per cent. alcohol: the tincture exhibited a slight greenish yellow fluorescence. The tincture was freed from alcohol by spontaneous evaporation, and the extract mixed with water, acidulated with sulphuric acid and agitated with benzole. During agitation, a brownish soft resin separated; this resin was insoluble also in ether, but dissolved in alkalis with a dark yellowish brown coloration, and was precipitated by acid in brown flocks. The benzole solution left on spontaneous evaporation a viscid transparent residue of the colour and consistence of Venice turpentine, which possessed a slight odour of peppermint. This extract was soluble in absolute alcohol with greenish yellow fluorescence and was neutral in reaction: it was also soluble in ether, with similar fluorescence. The alcoholic solution gave with ferric chloride a dirty greenish precipitate. In cold 5 per cent. caustic soda it was insoluble, but on boiling it dissolved with some difficulty, affording a dark yellowish solution, while an odour not unlike that of aniseed was noticed. The cold caustic soda solution on agitation with ether afforded a small amount of yellowish white oily extractive with an odour of aniseed. The caustic soda solution on the addition of dilute acids afforded a yellowish precipitate. The original acid aqueous solution was next agitated with ether. The extractive was small in amount, partly in the form of a transparent varnish adhering to the sides of the capsule, and partly in indistinct whitish crystals. Heated with water, a portion

dissolved, affording a clear solution, but which became turbid on cooling from a deposit of yellowish flocks, which on microscopic examination were not found to exhibit a crystalline structure; we only detected minute globules. The aqueous solution was strongly acid in reaction, and gave with ferrie chloride a dirty greenish coloration, with lime water a bright yellow coloration, and with basic acetate of lead a sulphur-yellow precipitate. This principle, soluble in water, and reprecipitated on cooling, is probably allied to the Quercitrin group of principles. That portion of the residue insoluble in water, was in properties similar to the resin dissolved by benzole.

The aqueous acid solution was lastly rendered alkaline and agitated with ether. The ethereal extract was not more than a trace, but afforded all the reactions in a marked degree of an alkaloidal principle.

The leaves also afforded marked evidence of the presence of an alkaloidal principle soluble in ether, and probably similar to the one we detected in the roots. (Pharmacographia Indica, II. 539).

848. *I. vitifolia*, sweet. H.F.B.I., IV. 213.

Vern. :—Nawal (Bomb.).

Habitat :—Throughout India.

A large hairy climber, Leaves 2-6in., diam., cordate, palmately 5-lobed. Petiole $\frac{1}{2}$ -2in. Peduncles 1-7-fid., 1-4in. Sepals ovate acute, hirsute; often $\frac{3}{4}$ in. in fruit. Corolla $1\frac{1}{2}$ in., campanulate, sulphur-coloured. Capsule $\frac{1}{2}$ in. diam., depressed, globose, membranous, 2-celled, normally 4-seeded. Seeds glabrous.

Uses :—The juice is in the Konkan considered cooling and is given with milk and sugar. A *lep* is prepared, consisting of the juice, with lime juice one part, opium $\frac{1}{2}$, and Coptis teeta $\frac{1}{4}$, which is applied around the orbit of the eye in inflammation. (Dymock).

849. *Convolvulus arvensis*, Linn. H.F.B.I., IV. 219.

Syn :—*C. Malcolmii*, Roxb 159.

Vern :—Veri (?); Hiranpadi (Pb. and H.); Hirn-pug (Guz, Sind); Naranji (Kan).

Habitat :—Western India, from Kashmir to the Deccan.

A glabrous or somewhat pubescent herb. Root-stock creeping. Stems slender, prostrate, twining, 6-24in. Leaves ovate cordate, auriculate or hastate, 1-3in., lower often lobed; petioles $\frac{1}{4}$ - $\frac{2}{3}$ in. Peduncles 1-2in. long, 1-3-fid; bracts small, $\frac{1}{2}$ in., linear.

Pedicels $\frac{1}{8}$ -lin. Sepals $\frac{1}{4}$ in., elliptic, obtuse, glabrous or nearly so, with or without a mucro. Corolla widely funnel-shaped, glabrous, middle-sized, purplish. Capsule $\frac{1}{4}$ - $\frac{1}{2}$ in., glabrous. Seed subtrigonal, dark-brown.

Use :—The root possesses cathartic properties and is sometimes used by the Sindhis as jalap (Murray).

It contains convulvin.

850. *Evolvulus alsinoides*, Linn. H.F.B.I., IV. 220; Roxb. 276.

Sans. :—Vishnugandhi.

Vern. :—Sankhpashpi (Pb.); Shankhaveli (Bomb.); Vistnoo-krandie (Tam.); Vistna-clandi (Malayalam); Vistnoo-krandum (Tel.).

Habitat :—Very common throughout India; rare in very damp regions.

A much-branched diffuse perennial herb; annual branches many, spreading from a short woody root-stock, wiry, more or less pilose or sometimes almost glabrous. Leaves variable, sessile or nearly so, $\frac{1}{4}$ -lin. long, lanceolate to ovate, obtuse, mucronate, acute at the base, densely clothed with appressed white or fulvous silky pubescence. Flowers blue or white, on 1-3-flowered filiform peduncle; bract small, linear, hirsute, persistent, pedicels filiform. Calyx densely silky; segments $\frac{1}{8}$ in. long, lanceolate, acute. Corolla subrotate, $\frac{1}{2}$ in. long. Capsule $\frac{1}{8}$ - $\frac{1}{2}$ in. in diam., 4-valved and usually 4-seeded. (Duthie.)

Parts used :—Leaves, stalks and roots.

Use :—In the Vedic period, it was believed to possess the power of promoting conception. The Mahomedan physicians believe that this plant has the power to strengthen the brain and memory (Dymock).

It is used as a febrifuge with cunim and milk also as an alterative and with oil to promote the growth of the hair (Rheede).

The leaves, stalks, and roots are all used in medicine by the Tamools, and are supposed to possess virtues in certain bowel affections. They are prescribed in infusion in the quantity of

half a teacup-ful twice daily. (Ainslie). It is reputed to be a sovereign remedy for dysentery.

The plant is used in Ceylon as a bitter tonic and febrifuge.

The root is used by the Santals in intermittent fever of children (Revd. A Campbell).

The leaves are made into cigarettes and smoked in chronic bronchitis and asthma. The plant is astringent, useful in internal hæmorrhages (Surgeon-Major Hunston, in Watt's Dictionary).

Ether separated from the powdered herb a yellow neutral fat of the consistence of vaseline. The alcoholic extract contained an alkaloid of a slightly bitter taste, and affording no colour reactions with strong mineral acids. An organic acid of a deep red brown colour occurred in the water extract, and formed an uncrystallizable compound with lead. A quantity of saline matter was present in this drug. (Pharmacograph. Ind. II. 544).

851. *Cressa cretica*, Linn. H.F.B.I., IV. 225 ; Roxb. 265.

Sans :—Rudantika, Amrita-Srava.

Vern. :—Gûn (Sind.); Khardi (Bomb.); Chavel (Nâsik); Uppu Sanaga (Tel.).

Habitat :—Throughout India, from the Punjab and Calcutta to Ceylon.

A small erect bush-like annual. Stems 6-18in. long, slender, much branched. Leaves crowded, sessile $\frac{1}{2}$ - $\frac{3}{4}$ in. long, densely silky-hairy; lower cordate, upper smaller, ovate or lanceolate. Flowers very shortly pedicelled, white or pink; bracts 2, small linear, appressed to the calyx. Calyx densely silky; segments $\frac{1}{2}$ in. long, elliptic, obtuse, concave. Corolla $\frac{1}{2}$ in. long, divided down to the middle; lobes oblong, reflexed, hairy outside near the apex. Capsule $\frac{1}{2}$ - $\frac{3}{4}$ in long, ovoid, pointed, hairy at the apex. Seeds 4. (Duthie.)

The Indian plant differs from the common form *C. cretica*, in having the capsule 4 seeded.

Uses :—It is considered by Sanskrit writers to be exhilarating, and to purify the blood and give tone to the system. It is presented in decoction.

It is used as a tonic and believed to possess expectorant properties (S. Arjun).

Chemical composition.—The plant contains an alkaloid soluble in ether, which fails to afford any special colour reactions ; its solution is not precipitated by chromates. It is not bitter. There is nothing else in the plant of special interest.

852. *Cuscuta reflexa*, Roxb. H.F.B.I., IV. 225 ;
Roxb. 150.

Sans. :—Amaravêla.

Vern. :—Haldi-algusi-latâ. Algusi (B.) ; Alagjari (Santal.) ; Nilâthâri, virâdhar, âmil, zarbuti (Pb.) ; Bazar names of the seed :—A'kâsbel, âftimûn, kasus (H. and Pb.) ; Akaspawan, Amarwêl (Dec.) ; Akaswêl (Guz.) ; Nirmuli Âkâshwêl (Mar.) ; Sitama purgonalu ; Sitamma pôgu nulu (Tel.).

Habitat :—Common throughout India ; abundant in Bengal Plains.

A leafless, twining parasite, with stout fleshy branches forming dense yellow masses on low and tall trees and shrubs, with greenish white waxy or yellow fragrant, flowers shortly stalked crowded in numerous clusters or racemes, 5-merous. Recemes 1-4 in. long. Pedicels 0- $\frac{1}{4}$ in., often verrucose. Bracts $\frac{1}{20}$ in. Sepals $\frac{1}{10}$ in., nearly distinct, ovate. Corolla campanulate, deciduous $\frac{1}{4}$ - $\frac{1}{3}$ by $\frac{1}{8}$ in., subcylindric, lobes short, triangular, reflexed ; scales remote from the filaments, prominent, emarginate, fimbriate. Stigmas 2, long, acute, wide apart, lanceolate. Styles very stout. Capsule $\frac{1}{4}$ - $\frac{1}{3}$ in., fleshy, acute when unripe, circumsciss near the base when mature, subquadrate obtuse, tough, fleshy, 4-seeded. Kanjilal makes the following remarks :—“The leafless character is carried even to the embryo which is destitute of cotyledons. The seed germinates on the ground, but the plant does not seem to derive much nourishment from it, its growth being sustained, for the little while it is obliged to shift for itself, by the fleshy albumen in which the germ-plant is imbedded in the seed. As soon as the seedling twines itself round a woody plant, it develops several thick sucker-like haustoria along the surface of contact, which, penetrating the bark of

the host, begin to draw nourishment from the cambium layer. Directly it is affected, it loses its attachment to the soil, and the portion below the lowest haustorium then dries and drops off. Henceforth the parasite goes on flourishing entirely at the expense of the host".

Uses :—The seeds are regarded as carminative, and for this purpose are boiled and placed over the stomach. They are also applied as an anodyne. A cold infusion is given as a depurative. They constitute part of the *Kasûs* or purgative medicine sold in the Punjab (*Stewart*).

The native doctors of Sind and the Punjab regard the seeds of this plant as alterative, used along with Sarsaparilla to purify the blood. The natives having observed that the plant severs its connection with the earth, and not having discovered the existence of parasitic roots, viewing the attaching suckers most probably as accidental, have a proverb that he who finds the roots of this plant will become possessed of boundless wealth and of the power of invisibility (*Murray*). It is probable that the seeds of *Cassytha filiformis*, *Linn.*, are sold and used indiscriminately with those of this plant under the vernacular name of *Âkâs bel*.

The stems of *C. reflexa*, are mentioned in the Bombay Gazetteer as specially useful in bilious disorders.

It is purgative and used externally against itch and internally in protracted fevers, retention of wind, and induration of the liver. It is also said to produce thirst (*Punjab Products*).

N. O. SOLANACEÆ.

853. *Solanum nigrum*, *Linn.* H.F.B.I., IV. 229.

Syn. :—*S. rubrum*, *Miller*; *Roxb.* 100 *S. incertum*, *Dunal*.

Sans. :—*Kâkamâchi*, *Kâkamâtas Dhvânksha-mâchi*, *Jaghana-phala*, *Kinkivi*.

Vern. :—*Makoi* (H.); *Kâkamâchi*, *Tepâri*, *Gurkâmâi* (B.); *Kambei*; *Kakmach*; *Mako* (Pb.); *Sankir* (Kangra); *Munnatakali-pullum* (Tam.); *Kâncchipundu* (Tel.); *Kâmuni*; *Ghâti* (Bomb.). *Kâncchi*, *Ganike* (Kan).

According to the authors of the *Pharmacographia Indica* the Sanskrit names are probably applicable to this as well as the next species (*S. dulcamara*); whilst the vernacular names with the exception, perhaps of the Hindi, are only applicable perhaps to *S. nigrum*.

Habitat :—Common throughout India.

An erect nearly glabrous annual with much branched and somewhat angular stems. Leaves petioled, 1-3½ in. long, ovate or oblong, sinuate-toothed or lobed, petioles about ¾ in. long. Flowers small, drooping, subumbellate on rather stout extra-axillary peduncles ¼-¾ in. long; pedicels 5-8, slender, ½ in. long. Calyx ½ in. long, 5-toothed, glabrous or sparsely puberulous; teeth small, oblong, obtuse. Corolla white, rarely purple, ½ in. in diam., divided to below the middle into 5 oblong subacute lobes, glabrous outside. Filaments hairy at the base. Ovary globose, glabrous, style hairy towards the base. Berry ¼ in. in diam., supported by the saucer-shaped calyx, black, less often red or yellow, smooth and shining. Seeds yellow, minutely pitted. (Duthie.)

Use :—In Hindu medicine, the berries of this plant are considered tonic, diuretic and useful in anasarca and heart diseases (U. C. Dutt.)

In Bengal, the berries are employed in fever, diarrhœa, eye diseases, hydrophobia, &c. (T. N. Mukerji).

In the U. P., the juice is used in blood-spitting, piles, dysentery, &c.

In Bombay, the juice is given in doses of six to eight ounces in the treatment of chronic enlargement of liver, and is considered a valuable alterative (Dymock).

The juice acts as a hydragogue, cathartic and diuretic (Dymock). The syrup acts as an expectorant and diaphoretic (*S. Arjun*).

A syrup prepared from the plant is used as a cooling drink in fevers (*S. Arjun*). The Chinese employ the juice of the leaves to alleviate the pain in inflammation of the kidneys and bladder and in virulent gonorrhœa (Rumphius.)

Dr. Moodeen Sheriff reports having used with advantage a

decoction of the leaves of this plant, and also an aqueous extract prepared from it, the latter in drachm doses thrice daily, in the treatment of dropsical affections. Its action is diuretic and laxative. The juice of the leaves is stated by Dr. Shortt to be an excellent remedy in the aphthæ of childhood (Ph. Indic.).

In India the juice of *S. nigrum* is given in doses of from 6 to 8 ounces in the treatment of chronic enlargements of the liver, and is considered a valuable alterative and diuretic. The juice after expression is warmed in an earthen vessel until it loses its green colour and becomes reddish brown; when cool it is strained and administered in the morning. It is said to act as a hydrogogue cathartic and diuretic. Mr. M. Sheriff in his Supplement to the *Pharmacopœia of India* speaks very favourably of it when used in this way. In smaller doses (1 to 2 ozs.) it is a valuable alterative in chronic skin diseases, such as psoriasis. In the Concan the young shoots are cooked as a vegetable and given in these diseases. Dr. D. B. Master of Bombay informs us that he has seen them used with great success in psoriasis. Loureiro states that the herb is anodyne, and should be used with caution; he notices its use externally to allay pain.

It contains an active principle *Solanine* which has been investigated by Dr. Genenil. It is stated to slow the respiration, and to diminish the sensibility of the bronchial mucous membrane; but on the digestive organs it acts as an irritant, producing loss of appetite and a tendency to nausea or even vomiting. No effect on the pupil has been observed after its administration, although the pupils of children poisoned by *Solanum nigrum* has been found dilated. (Med. Chron., p. 135, for 1886)—Ph. J. 27th Nov. 1886.

854. *S. dulcamara*, Linn. H.F.B.I., IV. 229.

Vern.:—Ruba barik (Pb.). Inab-es-salib (Indian Bazars).

Habitat:—Temperate W. Himalaya, from Kashmir to Garwhal, Sikkim and Choongtam.

A glabrous or sparingly pubescent shrub, unarmed. Leaves 3-5 in., often cordate—oblong, acute, entire lobed or almost

pinnate; petiole 1in. Peduncles $\frac{1}{4}$ -4in. Cymes 2-5in. diam., pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in. Calyx in fruit almost saucer-shaped, lobes 5in. Flower $\frac{1}{2}$ in., ovate oblong. Corolla $\frac{2}{3}$ in. diam. Style glabrous. Berry $\frac{1}{4}$ in. diam., globose. Seeds $\frac{1}{10}$ in., smooth.

Uses:—Official in both British and Indian Pharmacopæias. In India, it is considered alterative, diuretic and diaphoretic; it is regarded as useful in constitutional syphilitic affections, chronic rheumatism, and especially so in psoriasis, lepra, and other obstinate skin diseases (Watt).

"The dried fruit of *S. dulcamara*, known as *Anab-es-salib* in Bombay, comes from Persia." (Pharmacographia Indica, Vol. II. p. 533).

Upon extraction with alcohol and water, the berries yielded 31.55 p. c. of sugar which appeared to be laevulose. The berries were then dried and extracted with ether, when an oil was obtained, amounting to 9.1569 p. c., After purifying, the oil was viscous and of amber colour. It had the sp. gr. 0.9604, and an acid value of 306. Nitrogen is present in the berries to the extent of 0.934 per cent. Evidence was obtained of the presence of acetic, tartaric, and citric acids. The total alkloid was 0.15 per cent, and appeared to be solanine. [B. R. Anderson, in *Chem. News*, 1911; abstract in *J. Ch. I.* for 31-7-1911, p. 921].

855. *S. spirale*, Roxb. H.F.B.I., IV. 230. Roxb. 255.

Vern.:—Bagua (Silhet); Mungus kajur (Patna).

Habitat:—Assam; Khasia Mountains and East Bengal.

An unarmed glabrous herb or undershrub, 4-12ft. Leaves attaining 8-3in., elliptic, entire, acute at both ends, glabrous or scarcely puberulous. Petiole $\frac{2}{3}$ in. Peduncles extra-axillary; pedicels long, densely, spirally racemed. Calyx $\frac{1}{2}$ in., cup-shaped in fruit, saucer-shaped, not enlarged. Calyx-teeth minute. Corolla white, $\frac{2}{3}$ in. diam., deeply lobed. Anthers oblong, scarcely narrowed upwards. Berry $\frac{1}{3}$ in. diam., globose smooth. Seeds $\frac{1}{4}$ in. diam., smooth.

Use:—The root is given in Patna as a narcotic and diuretic in doses of gr. $\frac{1}{4}$ to grs. viii. (Irvine).

856. *S. verbascifolium*, Linn., H.F.B.I., IV. 230.

Vern.:—Dursul (Nepal.); Sivor (Lepcha); Asheta (U. P.);

Chichora (C. P.); Kâlâ mewâ, tiari, olâ, kharwine (Pb.); Rosagadi mânu (Tel.).

Habitat:—Common throughout India, in the Tropical and Sub-tropical Zone.

Sub-Himalayan tract and outer hills from the Jumna eastward Chutia-Nagpur. Western Peninsula, Burma hills and Ceylon moist regions.

A shrub or small tree, unarmed, 20ft. high; Trimen says 6-10 ft. Bark grey, smooth. Wood soft, light-yellow (Gamble). The whole plant is covered with a dense yellowish-grey tomentum of scurfy stellate-hairs. Leaves large, 5-9in., lanceolate oval-elliptic or elliptic-lanceolate, rounded or acute at base, acuminate, subacute, tomentum velvety above, very woolly beneath; petiole $\frac{3}{4}$ -lin., stout. Flowers white or pale-blue, $\frac{3}{4}$ in. across, in compact, dichotomous corymbs. Peduncles 2-4in., stout erect. Calyx cup-shaped, very woolly, segments short, broadly triangular, acute. Corolla woolly without, $\frac{1}{2}$ in. diam.; lobes deep, oval-oblong, subacute. Berry $\frac{1}{2}$ in. diam., hairy at first, with small scattered stellate hairs, yellow. Calyx enlarged in fruit; lobes shorter than berry. Seeds minutely dotted.

N. B.—Wight's figure of this plant (Ic. T. 1398) is not good, says Trimen, Vol. III, p. 232 of Fl. Ceylon, Lond 1895.

Use:—It is used medicinally by the natives of India, but its properties are unimportant (Watt.).

857. *S. ferox*, Linn. H.F.B.I. IV., 233.

Syn.:—*S. hirsutum*, Roxb. 192.

Vern.:—Râm begoon (B.).

Habitat:—Eastern and Southern India, frequent in the tropical zone; from Assam to Ceylon and to Tenasserim.

A large herbaceous shrub. Stem stout, very densely covered with long, coarse, stalked, stellate hairs, and armed with numerous straight, slender, fat, shining prickles. The prickles on the leaves abundant; the longest $\frac{1}{2}$ in. Leaves 6-12in., with broad triangular lin.-deep lobes, usually 2 at a node and unequal, stellately fulvous-woolly beneath, prickly, especially on the nerves

beneath. Peduncles usually close below the leaves, short. Racemes densely stellately woolly and with needle-like hairs, not prickly. Flowers large, white. Calyx shortly funnel-shaped, shaggy, with long stellate hair, slightly enlarged in fruit; segments ovate-acute $\frac{1}{4}$ in., not acuminate. Corolla white, large, $1\frac{1}{4}$ in. diam., very hairy outside; lobes ovate-oblong, acute, $\frac{3}{4}$ -1 in. long. Ovary hirsute. Berry yellow, globose 1-1 $\frac{1}{2}$ in. diam.; densely clothed with needle-like hairs, $\frac{1}{8}$ - $\frac{1}{4}$ in. fulvous, spreading. Fruit pedicels $\frac{1}{2}$ -1 in. Calyx-lobes in fruit unaltered, hardly $\frac{1}{4}$ the length of the berry; base of the Calyx in fruit very densely clothed with long, yellow, bristly hair. Seeds $\frac{1}{8}$ in. diam., nearly smooth.

Use :—The berries are used medicinally by the natives, but are not considered of much value (Watt).

858. *S. indicum*, Linn., H.F.B.I., IV. 234; Roxb. 191.

Sans. :—Vrihati.

Vern. :—Barhanta (H.); Byākura (B.); Mulli, papparamulli (Tam.); Kuk-mâchi (Tel.); Cheru-chunta (Mal.); Ringani, dorli (Bomb.); Kandyari (Panj.).

Habitat :—Very common throughout tropical India.

An erect under shrub, 1-6 ft., much-branched, very prickly; prickles compressed, stout, often recurved. Leaves ovate-sinuate or lobed, 3-6 by 1-4 in., subentire or pinnatifid, stellately woolly beneath, nerves prickly. Petiole lin. Peduncles short, often extra-axillary, pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in., stellately woolly. Racemes many-fid. Flowers blue. Calyx lobes in flower $\frac{1}{2}$ in., triangular, acute, very woolly, unarmed or with slender, straight spines. Corolla $\frac{3}{4}$ -1 in., broadly triangular, tomentose without. Ovary usually glabrous; style stellately pubescent. Berry yellow, $\frac{1}{2}$ in. diam., globose, much exceeding the woolly, patent, triangular, oblong Calyx lobes; prickles of the lobes often strengthened in fruit. Seeds $\frac{1}{8}$ in. diam. and upwards, smooth or very nearly so.

Parts used :—The root; leaves.

Uses :—“The root constitutes an ingredient of *Dasamula*,

which is used largely in a great variety of diseases. It is regarded as expectorant and useful in cough and catarrhal affections" (*Hindu Mat. Med.*). It is prescribed by the Indian doctors, in cases of dysuria and inchuria, in the quantity of half a tea-cupful twice daily. Horsefield reports that the root taken internally manifests strongly exciting qualities. It is employed in difficult parturition and in toothache. It is also used in fevers, worm complaints, and colic (Sakharam Arjun).

Used in skin diseases of children (Ibbetson's *Gujrat*). The juice of the leaves, with fresh juice of the ginger, is administered to stop vomiting. The leaves and fruit, rubbed up with sugar are used as an external application to itch (Agra Exhibition).

200 grams of the fruits were found to consist of 58 grams of pericarps and 142 grams of seeds. These were powdered and examined separately, and had the following composition—

	Pericarps.	Seeds.
Ethereal extract	9	13.5
Alcoholic "	5.8	10.1
Aqueous "	13.8	22.9
Mineral matter	11.2	7.7

The pericarps contained a yellow wax-like principle melting at 45°, a trace of an alkaloid answering to solanine, and a quantity of ammonia combined as an ammonium salt. The seeds afforded 13.5 per cent of a yellow oil having a specific gravity of .9273. After saponification of the oil by alcoholic potash, the free fatty acids were liberated and found to consist mainly of oleic acids, and on standing in a cool place for several days, some white crystals separated out, having a melting point approximating that of myristic acid. An alkaloid was present in the seeds which could not be referred satisfactorily to solanine, and it was associated with a glucosidal principle giving a purple-coloured solution with sulphuric acid. The seeds like the pericarps contained an ammonium salt, and both portions of the fruit gave off strongly alkaline fumes on burning, and in which ammonia was easily detected. The fruit when dried and kept for some time are almost tasteless compared with their bitterness and acidity when fresh, and it would consequently appear that the alkaloids solanine and solanidine, become decomposed with the production of ammonia and other substances. (*Pharmacographia Indica*, II. 556-557).

859. *S. Melongena*, Linn., H.F.B.I., IV. 235 Roxb.
190.

Vern.:—Baingan (Hind.); Begun (Beng.); Bengan (Pb.); Wangi (Dec.); Kuthirekai (Tam.); Vanga-ehiri-vangu (Tel.) Kha-yan (Burm.); Baigana, vânge (Bomb.).

Habitat :—Generally cultivated in India.

A prickly, herbaceous annual, 2-8ft. ; sometimes nearly unarmed. Leaves 3-6 by 2-4in., ovate, sinuate or lobed, stellately woolly beneath, prickly. Petiole lin., peduncles mostly extra-axillary, often paired, one becoming a perfect flower, the other a short raceme of male flowers ; or the raceme may be considered sessile with the lowest flower only perfect. Calyx-lobes lanceolate, in flower $\frac{1}{4}$ - $\frac{1}{2}$ in, elliptic or oblong-linear. Corolla blue, 1-1 $\frac{1}{4}$ in. diam., shortly lobed, hairy on the plaits without. Style stellately pubescent, or glabrous. Berry 1-9in., glabrous, exceeding the Calyx-lobes in cultivation, ellipsoid or elongate white, yellow, dark-purple, crimson or white, with tooth crimson, vertical stripes. Calyx-lobes fleshy and enlarged, in fruit often prickly. Fruit luscious, edible.

Many distinct forms or races are recognized according to the shape or colour of the fruit. The plant is more or less prickly according to the nature of the soil. In rich garden soil the prickles almost or entirely disappear. When cultivated as a field crop it becomes rather prickly, and very much so as an escape, under which conditions the peduncles bear 3-4 small and usually roundish fruits. Prain mentions two varieties ; 1. *Esculenta* (S. longum, Roxb.), a stout prickly herb with the fruit always cylindrical, and, according to Roxburgh, a distinct species ; and 2. *Insana* (Sⁱ insanum, Roxb.) which is a very prickly herb found in a semi-wild state near villages. Its fruit is quite round, and the fruiting peduncles usually bear more than one (Duthie.)

Parts used :—The leaves and seeds.

Use :—The seeds are used as a stimulant and the leaves as a narcotic (Atkinson.) The seeds are apt to lead to dyspepsia and constipation (Stewart).

860. *S. xanthocarpum*, Schrad. and Wendl.
H.F.B.I., IV. 236.

Syn :—S. Jacquini, Willd. Roxb. 191.

Sans :—Kanta-kâri, nidigdhika.

Vern. :—Katilâ, katai (Hind.) ; Katakâri (Beng.) ; Warûmba, mahori (Pb.) ; Chundun-ghatrie, kandan-kattiri (Tam.) ; Van-Nellagulla (Kan.) kuda (Tel.) ; Bhûringni (Bom.) ; Kandui (Chipat) (Pb.) ; Rât-kât-Janum (Chutia Nagpur).

Habitat :—Common throughout India ; from the Punjab and Assam to Ceylon and Malacca.

A very prickly, diffuse herb, 1-4ft.-diam., bright-green mature, nearly glabrous. Leaves 4-5in. by 2-3in., ovate, or elliptic, sinuate or sub-pinnatifid, glabrescent, very prickly spines, $\frac{1}{2}$ in., straight; petiole 1in. Peduncles short, mostly extra-axillary. Cymes lateral, few-fid. Flowers blue, few, all perfect. Pedicels and Calyx stellately pubescent, or at length glabrous. Calyx in flower $\frac{1}{2}$ in., lobes ovate oblong usually prickly, hardly enlarged in fruit. Corolla 1in. diam., pubescent without; lobes shallow. Berry yellow or whitish and green-blotched, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. globose, glabrous, much exceeding the Calyx-lobes. Seeds $\frac{1}{12}$ in. diam., glabrous.

Uses:—"The root is much esteemed as an expectorant, and is used in cough, asthma, catarrhal fever and pain in the chest. Kantikâri is used in medicine in various forms, such as decoction, electuary, ghrita, &c. A decoction of the root is given with the addition of long pepper and honey, in cough and catarrh, and with the rock salt and assafoetida in spasmodic cough" (Hindu Mat. Med.).

The roots beaten up and mixed up with wine are given to check vomiting. The juice of the berry is also useful in sore-throat (Agra Exhibition).

The root is largely employed in catarrhal and febrile affections, having expectorant, diuretic and other properties assigned to it. The stems, flowers and fruit, according to Dr. Wilson (Calcutta Med. Phys. Trans. Vol. II., p. 406), are bitter and carminative, and are prescribed in those forms of the burning of the feet (*Ignipeditis*) which are attended with a vesicular, watery eruption. Fumigations with the vapour of the burning seeds of this plant are in high repute in the cure of toothache. It acts as a powerful sialogogue, and by this means probably relief is obtained (Ph. Ind.).

In the Concan 2 tolas of the juice of the fresh plant, with 2 tolas of Hemidesmus juice, are given in whey as diuretic, and the root with chiretta and ginger is given in decoction as a febrifuge. Dr. Peters, of the Bombay Medical Service, informs us that in Bengal the plant is much used as a diuretic in dropsy.

In the Panjab hills, the expressed juice of the leaves is given

with black pepper, in rheumatism. The leaves are also applied locally, to relieve pain (B. D. Basu). A decoction of the plant is used in cases of gonorrhoea.

"The bud and flower, with salt (solution) good for watery eyes (J. J. Wood's *Plants of Chutia Nagpur*, p. 122).

The fruit of this plant were found on analysis to have a similar composition to those of the *S. indicum*, except that in this case the fruits were examined in a fresh condition, and the solanine reactions of the alkaloid and the almost entire absence of ammonia were noticed. The dried leaves left 20.74 per cent. of ash when burnt, and contained traces of an alkaloid, and an astringent organic acid giving a green precipitate with ferric salts. (*Pharmacographia Indica* II, 559.)

861. *S. trilobatum*, Linn. H.F.B.I., IV. 236; Roxb. 192.

Sans.:—Alarka.

Vern.:—Toodavullay (Tam.); Moond-la-moosteh; Oochinta kura (Tel.); Motaringani mula (M.); Nabhi-ānkuri (Uriya).

Habitat:—W. Deccan Peninsula; from the Concan southwards and frequent, every common on waste ground, in dry regions.

A small under-shrub, subscented by its numerous hooked prickles. Stems 6-12ft., slender, with long divaricate branches, with a few stellate hairs on the young shoots, otherwise nearly glabrous, provided with many flattened, hooked, decurved, very sharp prickles. Leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in., irregularly 3-5-lobed, rotund, ovate or ovate elliptic in outline, obtuse, glabrous, often with 2 or 3 small curved prickles in the midrib; base not cordate. Petiole as long as the leaf or half as long, prickly. Peduncles short, mostly extra-axillary short, 1-3fid, pedicels $\frac{1}{2}$ -1 $\frac{1}{2}$ in., with very strong, short, recurved prickles. Flowers large, on long divaricate or reflexed glabrous pedicels, says Trimen, rich violet-purple. Cymes racemose, short, 3-9-flowered, nearly sessile. Calyx small, slightly stellate, hairy, segments lanceolate acute, hardly elongate in fruit. Corolla 1 $\frac{1}{4}$ -1 $\frac{1}{2}$ in. diam., stellate pubescent without, lobes very deep, oblong oval, obtuse, usually reflexed. Berry $\frac{1}{2}$ in., smooth, scarlet, globose, much exceeding the Calyx-lobes. Seeds $\frac{1}{8}$ in., smooth, or very nearly so. Berries edible.

Uses:—The root and leaves are bitter and prescribed in consumptive cases in the form of electuary, decoction and powder. The berries and flowers are given in cough (Ainslie).

862. *S. gracilipes*, Dene. H.F.B.I., IV. 237.

Vern.:—Howâ, marghî pal, kauri bâti, kandiari (Pb.).

An undershrub, with prickles, short, conical, subrecurved, minutely stellately pubescent. Leaves $1\frac{1}{2}$ in. diam., obtuse, rarely lobed, usually shallowly cordate, ovate or orbicular, sinuate, often subcordate, not prickly. Petiole $\frac{3}{4}$ in. Peduncles very short or 0, axillary or pedicels $\frac{1}{2}$ – $1\frac{1}{2}$ in., 3 together, subterminal or very short lateral spurs. Calyx-lobes $\frac{1}{2}$ in., linear; in fruit $\frac{1}{3}$ in. Corolla $\frac{2}{3}$ in. diam., deeply lobed. Berry $\frac{1}{4}$ in. diam., globose, glabrous, exceeding the sub-linear sepals. Seeds $\frac{1}{8}$ in. diam., smooth.

Uses:—The fruit is said to be collected by the hakims to be applied to otitis (Dr. Stewart). The leaves are also officinal.

863. *Physalis minima*, Linn. H.F.B.I., IV. 238; Roxb. 189.

Vern.:—Habbi kaknaj (Pb.); Buntepuriya (B.); Toolati-pati (H.), Thanmori; Nanvachi-wel (Bomb.); Kupanti (Tel.).

Habitat:—Throughout India.

An herbaceous, pubescent annual. Leaves 2 in., ovate, sinuate, angular or scarcely lobed. Petiole 1 in.; pedicels $\frac{1}{4}$ – $\frac{1}{2}$ in. Stem erect 6–18 in. height; flowers solitary, on long slender deflexed pedicels. Calyx at flower time $\frac{1}{8}$ – $\frac{1}{6}$ in.; lobes lanceolate, half the length of the Calyx, often hirsute, sometimes glabrescent. Corolla clear yellow, $\frac{1}{4}$ in. Calyx $\frac{1}{2}$ –1 in., ovoid or subglobose, 5–10 ribbed. Berry $\frac{1}{2}$ in. diam. Seeds very many, $\frac{1}{12}$ in. diam., discord, reticulated, scarcely scabrous.

Uses:—The fruit is considered tonic, diuretic, and purgative, in the Punjab. (Dr. Stewart). Used for horses and gonorrhœa in the Gujrat district of the Punjab (Ibbetson). In the Concan the plant is made into a paste with rice water and applied to restore flaccid breasts, in accordance with the doctrine of signatures (Dymock).

Var. indica. H.F.B.I. IV. 238.

Vern :—Phopetie ; Chirboti or Chirbutti ; Kapparpodi (M.).

Habitat :—Throughout India.

The leaves and fruiting calyx are glabrescent, and the latter is distinctly 5-angular. The corolla has no basal spots.

Uses :—It is considered to be tonic, diuretic and purgative, and is an ingredient in a medicinal oil which is given for spleen, the other ingredients are Pokarmul. Hing, Hirda, Long pepper, Bidalawan (Black salt), Sendhav (Rock salt), Javakshara (ash of potash), ginger, and melted butter. (Dymock).

CAPSICUM, LINN.

This genus contains the various forms of Chillies and Red and Yellow Peppers so widely cultivated in India and other tropical countries. It is indigenous in S. America and is believed to have been introduced into India about the middle of the seventeenth century. The very large number of cultivated forms, many of which were previously recognized as distinct species, have by recent authors been reduced to the two original Linnean species: *C. annuum* and *C. frutescens*, the one an annual and the other a perennial. Moreover, there is some probability that these two may have originated from a single very variable S. American species; for, as Prain remarks, the forms of *C. annuum* are often not truly annual in the tropics, and in temperate regions the perennial tropical forms rarely persist for more than one season.—(Duthie.).

864. *C. frutescens*, Linn. H.F.B.I., IV. 239 Roxb.
193.

Eng. :—Spur Pepper, Cayenne Pepper.

Vern. :—Lâl or gâch-marich, lâl lankâ marich, lankâ (B.); Lâl or gâch-mirich, lâl-mircha (H.); Kursâni (Himalaya); lâl-mirchi (Bom.); Mirchi (Guz.); Tambhuda mirchingay, mirchi (Mar.); Mullâ-ghâi (Tam.); Mirâpa-kâia, golakonda, mirapah, sima, sudi-mirapa-kaia (Tel.); Ladu mira, chabai, kappal-melaka, chabe-lombok, ladamera, ladamera china (Mal.); Menashinâ kâyi (Kan.)

Habitat :—Cultivated throughout India.

A perennial herb, universally cultivated throughout India for its fruit, known as the Chilli. Leaves entire or repand;

pedicels solitary. Flowers white, fruit a berry often 3 by lin., tapering at the end, pendent, elongate oblong, often curved, red, orange, white, purple or yellow. Seeds numerous, discoid. Embryo peripheric.

Uses:—Chillies are used in native practice in typhus, intermittent fevers and dropsy, also in gout, dyspepsia and cholera. Externally, they are used as rubefacient and, internally, used as stomachic (Atkinson).

"A dose of ten grains of finely powdered capsicum seed, given with an ounce of hot water, two or three times a day, sometimes shows wonderful effects in cases of delirium tremens" (Surg.-Major Gray, Lahore).

Its other uses are nearly the same as those of the following one, for which it might be used as a substitute.

865. *C. minimum*, Roxb. H.F.B.I., IV. 239 Roxb. 193.

Vern.:—Gâch marich (H.); Dhan lancâ-marich, lâl morich (B.); Lâl-mirich, marchâ (Guz.); Mirchi, lâl mirch (Duk.); Usi-mulaghai (Tam.); Sudmirapa kaia (Tel.); Chalie, lodchina (Mal.); Kappal-melaka (Malabar).

Habitat:—Cultivated throughout India.

Throughout India extensively cultivated. Pedicels mostly 2-3 together. Berry small, often $1\frac{1}{2}$ by $\frac{1}{2}$ in., red, suberect, elongate-oblong (Bird's eye chillie of the English denizen.)

Uses:—"Acts as an acid stimulant, and externally as a rubefacient, used in putrid sore-throat and scarlatina; also in ordinary sore-throat, hoarseness, dyspepsia, and yellow fever; and in diarrhoea occasionally; also in piles" (Baden-Powell).

Braconnot obtained from capsicum, capsin, a soft, non-crystalline compound with a pungent taste, and from this capsicum-red. Witting and Tresh maintain that the active constituent is a crystalline substance termed capsaicin. Pubst found a trace of an alkaloid; he considers capsaicin to be an amorphous acid; and he detected considerable amounts of free oleic, stearic, and palmitic acids in the fruit. He concludes that the red colour of the fruit is probably carotin.

The whole fruit (1) was found to contain 90.25 per cent, of dry matter, (2)

the fruit husk 85.86 percent., (3) the seed 90.4, and (4) the placenta 87.34 per cent. The dry matter has the following composition :

	Ash.	Ether. extract.	Nitrogenous matter.	Non-Nitrogenous extract.	Crude. fibre.	Nitrogen.
1.	6.76	10.69	19.77	39.82	22.95	3.16
2.	5.66	5.14	14.31	49.07	25.83	2.29
3.	4.35	27.95	17.22	33.07	17.36	2.93
4.	11.30	7.07	28.54	39.88	13.48	4.57

	Nitrogen as ammonia.	Nitrogen as amides.	Proteid Nitrogen.
1.	0.217	0.093	2.321
2.	0.195	0.130	1.792
3.	0.061	0.061	2.938
4.	0.240	0.280	2.403

The following ash analyses are given of (1) the whole fruit, (2) the husks, and (3) the seed.

	K ₂ O	Na ₂ O	MgO	CaO	Al ₂ O ₃
1.	55.60	4.42	6.22	4.80	trace
2.	52.47	13.16	5.04	5.08	0.22
3.	40.12	2.50	10.43	3.46	—

	Fe ₂ O ₃	SiO ₂	Cl	So ₃	P ₂ O ₅
1.	1.44	2.04	3.88	6.44	16.82
2.	1.69	1.90	1.44	4.58	14.59
3.	0.81	1.70	2.65	4.97	33.95

As regards the manufactured products, the ordinary kinds are made by grinding the whole fruit the stem being frequently included; they have a pale brick-red color. The best preparations are made with the husks and seeds only. To detect adulteration, microscopic examination is necessary, as well as estimation of the ash. The pure ash is usually white or slightly greenish, and dissolves almost entirely in dilute acids.—J. Ch., S. LXIV. pt. II. (1893) p. 546.

The oil extracted by ether from the seeds of capsicum becomes green when kept in a vacuum over sulphuric acid. Its sp. gr.=0.91095 at 15°; iodine number, 119.5; Köttsdorfer number=187.2. It contains C=76.35, H=11.35 per cent. The mean of two determinations of free fatty acids (mainly palmitic, with some stearic and oleic acids) in the oil was 2.75 per cent., or 0.64 and 0.70 per cent, in the fresh and dried seeds respectively. The glycerides calculated as olein (which was the chief constituent) amounted to 24.06 per cent, in the dry seeds. When the oil is long exposed to air, an intense green colour is produced owing to the presence of a small quantity of chlorophyll.

In separating the free fatty acids from the glycerides by extracting once or twice with light petroleum, it was noticed that the acids had a sharp, burning taste, due to the presence of an active substance which was separated in small quantity. This forms white crystals, very readily soluble in chloroform and ether, rather soluble in light petroleum, sparingly soluble in absolute

alcohol, and insoluble in water. It has an acid reaction, dissolves in alkaline solutions, but is precipitated by carbonic anhydride. It has an extremely burning taste, and, when heated, gives off vapours which violently attack the mucous membrane.

The average amount of lecithin in the dried seeds was found to be 1·82 per cent., when determined directly by Schulze and Steiger's method.

Fresh analyses of the seeds were made, as before, by Henneberg's method, but the results do not differ much from those previously obtained, except in the case of nitrogen-free extract (29·64) and the crude fibre (21·23 per cent, on dry matter). The crude fibre was redetermined by Schulze's method; the average result was 30·50 per cent. The nitrogen-free extract then amounts to 20·19 percent, consisting in part only of carbohydrates. There seems to be only a trace of a true carbohydrate (either dextrose or a substance which, when hydrolysed, gives dextrose); pentoses are present in greater amount, whilst galactose, mannose, starch, and cane sugar, etc., could not be detected.

By means of 1·5 per cent aqueous potash, a new carbohydrate, termed *capsicum seed mucilage*, was extracted from the seeds. It is insoluble in water, merely swelling. With iodine, a green coloration is produced which rapidly becomes blue. Zinc chloride and potassium iodide give no reaction. After boiling with acids, it readily reduces Fehling's solution. It contains pentose and probably galactose groups.

The pure ash of the placenta has the following percentage composition.

K ₂ O	Na ₂ O	CaO	MgO	Fe ₂ O ₃	P ₂ O ₅
66·06	4·44	4·70	3·97	0·88	8·75
So ₃	SiO ₂	Cl			
8·32	3·72	2·89			

Alumina and manganese were found in traces in the ash.—J. Ch. S. LXX. pt. II. p. 209-210. (1896).

866. *Withania somnifera*, Dunal. H.F.B.I., IV. 239.

Syn. :—*Physalis flexuosa*, Linn. Roxb. 189.

Sans. :—Ashvagandhâ.

Vern. :—Asgand (H.); Amkoolang (Tam.); Peneroo (Tel.); Pevetti (Mal.); Nati-ki-asgand (Deccan); Amuk-kura-virai (Tam.); Bunera-gadda-vittulu (Tel.); Bayman (Sind).

Habitat :—Throughout drier, subtropical India; frequent in the West and Hindustan, rare in Lower Bengal.

An unarmed, erect shrub, attains 5ft., often semi-shrubby at base; root long, tapering. Stems branched, covered with

fine, nearly stellate, pubescence. Branches round. Leaves 2-4 in., 3-5, says Brandis, subacute, ovate, suddenly tapering at base, entire, shining and apparently glabrous, but really with minute stellate or scaly hair, rather thick, veins pellucid. Petiole 1-1½ in. long. Flowers hermaphrodite, rather small or short, pubescent, pedicels usually about 5 in., in umbellate cymes. Pedicels 0-¼ in. Calyx campanulate; in flower ¼ in.; in fruit ¾ in., stellate pubescent, segments linear triangular, recurved at apex. Corolla ½-¾ in. long, greenish or lurid yellow, lobes lanceolate, erect, but recurved in upper part, pubescent outside. Stamens 5, inserted on Corolla-tube; filaments linear, anthers level with the stigma. Ovary glabrous; style as the stamens. Fruit-Calyx inflated, papery, over ½ in., globose, slightly 5-angled. Fruit ⅓-¼ in. diam. Seeds ½ in. diam., smooth, compressed.

In the "*Materia Medica of Western India*" an opinion is expressed that the commercial article cannot be the root of *W. somnifera*. This opinion was founded upon a comparison of the drug with the root of that plant as found in the salt marshes near Bombay, where it acquires a twisted, woody, form, entirely different to the tapering, starchy root which it has when growing in sweet soil. Young roots obtained from Satara exactly corresponded with the drug of commerce. Another point of difference is the red colour of the inner bark in the Bombay roots, which was not observed in those from the Deccan. The foliage, flowers and fruit of both plants appear to be identical. (*Pharmacographia Indica*, II. 568.)

Uses:—The root is regarded as tonic, alterative, and aphrodisiac, and is used in consumption, emaciation of children, debility from old age, rheumatism, &c. (Dutt). It has also narcotic and diuretic properties. The root sold in the bazars of South India resembles Gentian root in external appearance. The ground root and bruised leaves are employed as a local application to carbuncles, ulcers, and painful swellings (*Pharm. Ind.*). The root is also said to have deobstruent properties. The leaves are very bitter, and are given in infusion in fevers. The fruit is diuretic. The Telinga physicians suppose the roots to be alexipharmic (Roxburgh).

"The authors of the Bombay Flora say that the seeds are employed to coagulate milk like those of *W. coagulans*. We have tried the experiment and find them to have some coagulating power.

"The plant is very common along the shores of the Mediterranean, where it has always been reputed to be hypnotic. The properties of *W. somnifera* have recently been investigated by Dr. Trebut with regard to its reputation for hypnotic properties; he states that he has obtained an alkaloid from it which has hypnotic action and does not produce mydriases. P. L. Simmonds (*Amer. Journ. Pharm.*, Feb., 1891) states that the plant is employed at the Civil Hospital, Alger, as a sedative and hypnotic." *Pharmacographia Indica*, II. 567).

In the Punjab, used for lumber pains and considered aphrodisiac. In Sind, used to cause abortion.

The seeds act as diuretic and hypnotic (Irvine). The late Dr. Burton Brown of Lahore recorded a fatal case of poisoning by the seeds of this plant. Rajputs regard the root as useful in rheumatism and dyspepsia.

Dr. Lal Mohan Ghosal concludes his paper on the Physiological Study of the properties of this drug as follows:—

1. The drug has two principles—one a bitter crystalline principle and the other an alkaloidal body.

2. The drug has got a sedative action on the nerves; the sedative effect is probably due to the action of the bitter principle which when injected into a guineapig caused a sort of sedative action. This is also verified by the convulsion and coma caused by the injection of the alkaloid.

3. The drug although acts as a sedative has got no depressant action on the heart at the same time. (*Food and Drugs*, Vol. I. p. 127).

Messrs. F. B. Power and A. H. Salway summarize the results of their analysis of this drug as follows:—

Preliminary tests, conducted with both portions of the plant, indicated the presence of an alkaloid.

I. *Constituents of the Root*.—An alcoholic extract of the root, when distilled with steam, yielded a very small amount of an essential oil. The portion of the extract which was soluble in water contained, besides indefinite, amorphous substances, a quantity of sugar, which yielded *d*-phenylglucosazone (m. p. 210°).

The portion of the extract which was insoluble in water consisted chiefly of a black resin, and amounted to about 2.7 per cent. of the weight of the root. From this resin the following definite substances were isolated: hentriacontane, $C_{31}H_{64}$; a phytosterol, $C_{27}H_{46}O$, (m. p. 135-136°); a mixture of fatty

acids, consisting of palmitic, stearic, cerotic, oleic, and linolic acids; ipuranol, $C_{23}H_{33}O_2(OH)_2$; a new monohydric alcohol, *withaniol*, $C_{25}H_{33}O_4$, OH, decomposing at 305° , and having $[a]_D + 91.2^\circ$; and an amorphous alkaloidal principle, which, on treatment with alkalis, yielded a crystalline base, $C_{12}H_{16}N_2$ (m. p. 116°).

II. *Constituents of the Leaves and Stems*.—An alcoholic extract of this material, when submitted to distillation with steam, yielded a very small amount of an essential oil. The portion of the extract which was soluble in water contained, besides tannin and colouring matter, a sugar yielding d-phenylglucosazone (m. p. 205°), and a considerable quantity of potassium nitrate.

The portion of the extract which was insoluble in water consisted chiefly of resinous material, and was obtained in the form of a dark green powder. This resin was found to contain a number of substances which had also been isolated from the root of the plant, such as hentriacontane, a phytosterol, $C_{27}H_{46}O$ (m. p. 133°), a mixture of fatty acids, and ipuranol. In addition to these, however, it yielded the following compounds: a new monohydric alcohol, *somnirol*, $C_{32}H_{43}O_6 \cdot OH$, decomposing at 205° and having $[a]_D + 34.8^\circ$; a new dihydric alcohol, *somnitol*, $C_{33}H_{44}O_5(OH)_2$, decomposing at about 250° , and having $[a]_D + 21.2^\circ$; and an acidic, hydrolytic product, *withanic acid*, $C_{29}H_{43}O_8 \cdot CO_2H$ (m. p. 226°), the methyl ester of which decomposed at 255° .

In as much as the *Withania somnifera*, unlike some other solanaceous plants, had been found to contain no mydriatic alkaloid, it was deemed of interest to ascertain whether the sedative or hypnotic properties attributed to it could be confirmed. For this purpose, some tests were kindly conducted for us at the Wellcome Physiological Research Laboratories by Drs. H. H. Dale and P. P. Laidlaw, to whom our thanks are due. It was thus ascertained that alcoholic extracts, representing about 7 grams of the root and 3 grams of the leaves and stems respectively, when administered to a dog had no perceptible effect. The hypodermic injection of the alkaloidal principle obtained from the root likewise produced in a dog no symptom of narcosis or other definite result. J. Ch. S. 1911. pp. 506-507).

867. *W. Coagulans*, Dunal. H.F.B.I., IV. 240.

Vern:—Akri, Punir-ke-bij (Hind.); Habbul-kâknaje-Hindi (Arab.); Tukhme-kaknaje-Hindi (Pers.); Ashvagandhâ (Beng.); Amukhurâ-virai (Tam.); Pannêru-gadda-vittulu (Tel.); Kakanâja, kâknaj (Bom.); Spinbajja, Shâpiang, Khum-a-zare; Makha-zura; Panir, Khamjira, Kutilaúa (Pb.); Punirband, Punir-jafota (Sind).

Habitat:—Punjab and Sind; and the Sutledge valley.

A somewhat grey, rigid, small shrub. Leaves densely clothed with minute, grey, stellate tomentum. Blade 1-2 in., oblong,

obtuse, ovate-lanceolate or oblanceolate, attenuate at base ; petiole indistinct, or $\frac{1}{4}$ - $\frac{1}{3}$ in. long. Flowers polygamo, diœcious. Flowering Calyx $\frac{1}{2}$ in. ; in fruit $\frac{2}{3}$ in., stellate, nearly leathery, closely surrounding the berry. Corolla $\frac{1}{2}$ in., lurid yellow, stellately mealy without. Male flower ; filaments linear, anthers subexsert. Ovary ellipsoid, style 0. Hermaphrodite flowers ;—anthers subsessile, perfect near the base of the Corolla tube. Ovary globose ; style linear, stigma level with mouth of the tube. Berry and seeds nearly as in *W. somnifera*. This plant has been found in the act of passing from dimorphism to diœcism (C. B. Clarke)

Uses.:—The ripe fruits are used as an emetic. The dried fruits, sold as *Punir-ja-fota* in Sind, are employed in dyspepsia and flatulent colic, and other intestinal affections. They are prescribed in infusion, either alone or conjoined with the leaves and twigs of *Rhazya stricta*, D., an excellent bitter tonic. The dried fruit is used for coagulating milk in the process of cheese manufacture (Ph. Ind.).

The ripe fruits are supposed to possess anodyne or sedative properties. Honnigberger says that the bitter leaves are given as a febrifuge by the Luhanees (Stewart).

It is alterative, diuretic and believed to be useful in chronic liver complaints (Dymock).

In Bombay it is usually confounded with the fruit of *Physalis Alkekengi*, Wild., imported from Persia, the *Hab-el-kákna*j or *Kákna*j of the Arabians, which is described by Ibn Sina as an alterative similar to *Dulcamara*, and especially useful in skin diseases. The berries of both plants have a reputation as blood purifiers. Recently, from experiments made by Sir J. D. Hooker at Kew, it has been ascertained that 1 oz. of the fruit of *Withania coagulans* and 1 quart of boiling water make a decoction, one tablespoonful of which will coagulate a gallon of warm milk in about half an hour. Experiments of a similar nature have been made on the Kilkerran Estate, the property of Sir James Fergusson, late Governor of Bombay ; four ounces of the fruit were allowed to simmer for 12 hours in $1\frac{1}{2}$ pint of water, and half the liquid

was then added to 55 gallons of milk; the milk curdled in an hour and a half, affording a firm curd free from taste and smell; of this a cheese was made which proved to be excellent (Dymock).

Chemical composition.—The following information is extracted from a report upon the "rennet" ferment contained in the seeds, by Mr. Sheridan Lea:—

"Taking equal weights of the seeds, I extracted them for 24 hours with equal volumes of (1) water, (2) 5 per cent. sodic chloride, (3) 2 per cent. hydrochloric acid, (4) 3 per cent. sodic carbonate. Equal volumes of each of the above were added in an acid, alkaline, and neutral condition, to equal volumes of milk, and heated in a water-bath at 38° C. The milk was rapidly coagulated by the salt and sodic carbonate extracts, much less rapidly by the other two; of the four, the salt extract was far the most rapid in its action. All subsequent experiments have shown that a 5 per cent. solution of sodic chloride is the most efficient in the extraction of the active principle from the seeds.

There is no doubt that the substance which possesses the coagulating power is a ferment closely resembling animal rennet.

I.—A portion of the 5 per cent. sodic chloride extract loses its activity if boiled for a minute or two.

II.—The active principle is soluble in glycerine, and can be extracted from the seeds by this means; the extract possesses strong coagulating powers even in small amounts.

III.—Alcohol precipitates the ferment body from its solutions; and the precipitate, after washing with alcohol, may be dissolved up again without having lost its coagulating powers.

IV.—The active principle of the seeds will cause the coagulation of milk when present in very small quantities, the addition of more of the ferment simply increasing the rapidity of the change.

V.—The coagulation is not due to the formation of acid by the ferment. If some of the active extract be made neutral or alkaline, and added to neutral milk, a normal clot is formed, and the reaction of the clot remains neutral or faintly alkaline.

VI. The clot formed by the action of the ferment is a true clot, resembling in appearance and properties that formed by animal rennet, and it is not a mere precipitate.

The question of preparing an extract which should be capable of being kept for a considerable time is perhaps of importance. Ordinary commercial rennet usually contains a large amount of sodic chloride and some alcohol. One specimen I analysed contained 19 per cent. of common salt, and 4 per cent. of alcohol. I have, therefore, added to the 5 per cent. chloride extract mentioned above enough salt to raise the percentage of this to 15 per cent., and also alcohol up to 4 per cent. The activity of the extract is not appreciably altered by this, and such a preparation corresponds very closely in activity with a commercial solution of animal rennet with which I compared it. The possibility of making extracts which may be expected to

keep, is thus indicated, but, of course, time alone will show whether the activity of the ferment is impaired to any important extent by such keeping.

I may add, in conclusion, that I have coagulated a considerable volume of milk with an extract such as I have described, and prepared a cheese from the curds. I have also given a portion of the extract to a professional cheese-maker, who has used it as a substitute for animal rennet in the preparation of a cheese. The product thus obtained, and the statements of the person who has made the experiment for me, led me to suppose that extracts of the seeds of *Withania* can be used as an adequate and successful substitute for animal rennet."

An attempt has been made by Mr. D. S. Kemp, of Bombay, to preserve the ferment by means of sugar, but with only partial success (Dymock).

868. *Lycium europæum* Linn. H.F.B.I., IV. 240.

Vern.:—Kangú, kúngu, ganger mrál, chirchitta (Pb. and Hind.); Achmehudi (Merwara); Gangas, ganger (Sind).

Sindh, Panjab, Marwara, Gujrat.

Habitat:—Western India.

A thorny nearly, glabrous, shrub. Branches grey. Leaves $\frac{1}{2}$ -lin., lanceolate or oblanceolate, linear-oblong, flowers solitary; pedicels shorter than or equalling the Calyx; rarely longer. Calyx $\frac{1}{8}$ in., often sub-bilabiate, 5-lobed irregularly, teeth rarely less than 5. Corolla $\frac{1}{2}$ in., from purple to nearly white; tube cylindric, widening upwards, lobes not half so long as the tube. Stamens exsert or subincluded; filaments glabrous at their base. Berry $\frac{1}{8}$ in. diam., yellow or red globose, many-seeded, edible.

Use:—The berries are used as aphrodisiac (Stewart).

869. *Atropa Belladonna*, Linn. H.F.B.I., IV. 241.

Vern.:—Sug-ungoor, Ungoor shefa (H.); Súchi (Pb.); Girbuti (Bomb).

Habitat:—Western Himalaya, Kashmir to Simla, Caucasus and North Persia, Baluchistan. I have seen it in Quetta (K. R. K.).

An erect, glandular, pubescent, or nearly glabrous, herb 2-3ft. Leaves stalked, ovate-lanceolate, 4-8 in., entire, long pointed, upper ones usually with a much smaller leaf springing from

the same point. Flower pale, purple, tinged with yellow or green, $\frac{3}{4}$ in. diam., single or drooping, usually axillary stalks. Calyx lobed nearly to the base. Segments leaf-like. Corolla bell-shaped; lobes 5, short, broad, spreading. Base of filaments hairy, dilated, covering the ovary. Ovary 2-celled. Style longer than the Corolla; stigma green. Berry globose, $\frac{3}{4}$ in. diam., purple black, surrounded at base by the enlarged spreading Calyx-leaves, a little more acuminate in the Himalayan plant than in the European.

Use :—Official in both Pharmacopæias.

The following report has been received from the Economic Botanist to the Botanical Survey of India, to whom sun-dried roots of *Atropa Belladonna*, grown at the Kutchery garden, Naini Tal, were submitted :—

" . . . The roots consisted of two kinds, viz., from one-year-old plants and from two-year-old plants, and were registered respectively No. 34375 and No. 34376. The alkaloid was estimated in each sample of root and it was found to occur to the extent of 0.4 per cent. in that from the one-year-old plants and 0.45 per cent. in that from the two-year-old plants. Belladonna roots obtained from Europe and used in British medicinal preparation contains from .2 to .6 per cent. of total alkaloids. The roots grown in Naini Tal are therefore of good average quality and are suitable for use in the Medical Store Departments of India."

Considering the fact that the soil in which these plants were grown cannot by any means be regarded as good, the report that the roots are of good average quality is most encouraging, and fully justifies the experiments being made on a more extensive scale.

In better soil, which is easily obtainable in the Ramgarh neighbourhood, I believe that far heavier yields and a considerably higher percentage of alkaloid will be obtained.

The Naini Tal results worked out as follows :—

Belladonna roots—1 year old ... 3,570 lbs. per acre (alkaloid 0.4 per cent).

Do. do. 2 year old ... 3,545 " " (alkaloid 0.45 per cent).

From the above it will be noticed that although the percentage of alkaloid was far greater in the two-year old roots the quantity harvested was actually less. The reason for this I am unable at present to explain beyond the fact that it was probably due to the plants having been grown in poor soil.

A point that should not be lost sight of is the ease with which this drug can be grown and the imperviousness of the crop to insect pests and animal life. A good stock of acclimatized seed has been saved from both Naini Tal and Douglas Dale grown plants. The roots of the Douglas Dale grown plants rot during the rains, but seed, which is of a lighter colour than that produced in Naini Tal, has been saved.

Belladonna root is at present obtained from England by the Medical Stores

Department at a cost of about four pence per pound, so that there is every prospect of Belladonna being grown profitably in Kumaun.—*The Tropical Agriculturist*, from the *Annual Reports, Kumaun Government Gardens*.] Indian Forester, April 1914.

870. *Datura stramonium*, Linn. H.F.B.I., IV. 242.

Vern.:—Sâdâ dhâtûrâ (B.); Umatai (Tam.); Ummetta (Tel.)

Habitat:—Simla on waste ground. Temperate Himalaya, from Kashmir to Sikkim. Nearly throughout the globe, in temperate and warm climates.

An annual, erect, coarse, nearly glabrous, herb; 2-4ft. Leaves stalked, ovate, about 7 by 4in., coarsely and irregularly lobed and toothed. Flowers white, single, on short, usually axillary, stalks. Calyx tubular, 1-1 $\frac{3}{4}$ in., 4-5-toothed, 5-ribbed. Corolla funnel-shaped, 3-6in. long; limb spreading, 1-3in. across, 5-lobed, folding at the angles, lobes ending in narrow points. Stamens included. Ovary 4-lobed, 2-celled, covered with short, soft points. Stigma 2-lobed, oblong. Capsule ovoid, about 1 $\frac{1}{2}$ by 1in., covered with rigid sharp prickles, surrounded at base by the enlarged reflexed lower part of Calyx, ultimately 4-celled in the lower portion, opening nearly to the base by 4 valves. Seeds reniform, wrinkled.

Uses:—Official in both Pharmacopœias.

The *British Medical Journal* for May 16, 1903 contains an article on "Datura poisoning in the Federated Malay States," by Mr. John D. Gimlette, in which regarding its uses by natives of those states, he says:—

"The leaves are almost universally used in the treatment of asthma, but it is significant to note that Datura is not often given internally by natives. The Malays mix leaves with wine or powdered rice and saffron, and apply them externally for various pains and swellings. They will heat them over a torch until smoked, and then apply them as a poultice over the spleen in intermittent fever. The root is powdered and applied to the gums in order to relieve the pain of toothache. The flowers are dried and roughly powdered with or without the leaves and rolled into cigarettes for the relief of asthma."

Var.:—Tatula; H.F.B.I. IV. 242.

Flowers purple without and within. Found throughout India.

Use:—The young fruits, sold as *Gharbhuli* in Bombay, and *Maratia mûghû* in Madras, are said to be sedative and slightly intoxicating (Ainslie).

Hyoseyamine is the predominant alkaloid accompanied in most cases by scopolamine, present in the leaves, seeds, roots, fruit and stems. No atropine can be detected; but there is evidence of the presence of a third alkaloid in the roots.

Indian plant is quite equal to the European one with regard to total content of alkaloids, the figures obtained (referred to dry material) being:—seeds, 0.186; fruits, 0.46; leaves, 0.41-0.45; stems, 0.25-0.26; and roots, 0.214 per cent.—[Bull. Imp. Inst. 1911.]

The following is the composition of the oil obtained from the seeds:—palmitic acid, 10 p.c.; daturic acid (normal heptadecylic acid) 2.5; oleic acid 62; linolic acid, 15; unsaponifiable, 1; and glycerol, 9.6 per cent. The oil also contains small quantities of acids of higher molecular weight than those mentioned, but not stearic acid. Daturic acid is more soluble in alcohol than palmitic acid. —J. Ch. I. May 31, 1912, p. 500.

By distilling the leaves with superheated steam, 0.045 per cent of a dark-brown oil with a strong tobacco-like odour was obtained. The oil had an acid reaction and solidified at 20°C.; its sp. gr. was 0.9440 at 30°C. After purification in ethereal solution with animal charcoal, it had the acid value 52.4; "Saponification value 9.57." After saponification, an alcohol with a strong tobacco-like odour was obtained by distillation with steam.—J. Ch. I.

15, 12 1910, p. 1408.

D. Holde extracted 16.7 per cent. of oil from the air-dried seeds of *Datura Stramonium* by means of benzene. The alkaloid, *daturine* was apparently not extracted by the solvent, or at least could not be detected in the oil. The oil thus obtained was green to yellowish-brown in colour and had a characteristic odour. On standing it yielded a dark flocculent resin-like deposit. The filtered oil had an efflux velocity in Engler's apparatus nine times less than that of water at 20°C. Its specific gravity at 15°C. was 0.9175. When cooled to 0°C. it began to gelatinise; at -15°C. it became viscous, and thick at -15°C. It dried forming a firm skin, when heated in a thin layer for 13 hours at 50°C. whilst at the ordinary temperature it was still liquid after 23 days, and only showed signs of drying after 35 days. Its iodine value was 113, and its saponification value, 186. The fatty acids were judged to contain solid unsaturated readily oxidisable acids as well as solid saturated acids. The iodine value of the liquid acids was exceptionally low. The solid fatty acids fractionally precipitated by means of magnesium acetate, yielded, in addition to daturic acid, $C_{17}H_{34}O_2$ (m. pt. 55°C.) an acid of molecular weight 261, and m. pt. 60°-62°C. (palmitic acid, molecular weight 256, and m. pt. 62°C.), and an acid melting at 53°-54°B., and having a molecular weight of over 286.

J. Ch. I. Dec. 15, 1902 p. 1459.

871. *D. fastuosa*, Linn. H.F.B.I., IV. 242; Roxb. 188.

Vern.:—Kâlâ dhatûrá (Beng., Dec., and Hind.); Jouz-masleasvad (Arab.); Taturahe-siyâh (Pers.); Karu-umate (Tam.); Nalla-ummetta (Tel.); Pad-daing-phu, padáyinkhátta (Burm.).

Habitat:—A weed throughout India, in waste places.

An annual herb. Stem 1-2ft. high, stout, somewhat zigzag, rather succulent, polished and shining, but slightly rough, with very minute scattered hairs, divaricately branched, marked with scars of fallen leaves. Leaves alternate, 3-6in., triangular ovate, rounded and generally very unequal-sided at base, acute, entire or more often with a few large coarse acute teeth or lobes, apparently glabrous, but with a very minute mealy pubescence on both sides, dull glaucous-green above, paler beneath, veins pellucid. Petiole 1-2in. Flower white or rarely purple, very large, on very short stout stalk from the node, but not axillary erect. Calyx 3in., very minutely adpressed, pubescent, segments $\frac{1}{2}$ in., triangular, acuminate acute. Corolla-tube over 7in., gradually widening upwards, limb 4in. diam., lobes with the plait or midrib terminating in a short, linear, acute tail, pubescent on back. Stamens about as long as Corolla-tube, anthers nearly $\frac{3}{4}$ in. Ovary papillose, style over 6in. Capsule nodding, on curved pedicel, $1\frac{1}{2}$ in., supported base on reflexed base of Calyx, fleshy green, covered with numerous, scattered, short, straight, sharp prickles. Seeds very numerous, closely packed, nearly smooth, pale brown (Trimen).

Uses:—The seeds constitute a favourite poison for criminal purposes. The seeds and their preparations are generally employed by the Indian road poisoners not for the purpose of destroying life, but for stupefying their victims with the view of committing theft. Death may follow as a consequence of over-dose (Kanai Lal De). (See Chevers' Jurisprudence). They are also used to render liquor more intoxicating, being burned upon charcoal with vessels inverted to catch the smoke. The seeds are also used in the form of a powder for the same purpose, being more powerful in this form. When full of smoke the liquor is thrown into the vessel and the mouth

covered over for a night. It seems remarkable that when thus burned the smoke should retain the same poisonous and intoxicating properties. A few seeds with a *aqarqarhâ* (*Anacyclus pyrethrum*) root and cloves are chewed as an aphrodisiac (Dr. Emerson).

The seeds, leaves and fresh juice are narcotic, anodyne and antispasmodic. They are more powerful than those of *D. alba*, both of which, however, are used in the treatment of mania, epilepsy and obstinate headache. An alkaloid, Daturine, is useful as a substitute for Belladonna, and is prepared from the seeds (Kanai Lal De Bahadur).

Dr. Oswald reports having seen great and immediate relief follow smoking a small quantity of the leaves of this species in cases of asthma (Ph. Ind.).

"In painful swellings I apply the juice of fresh leaves, or make a poultice of them. The fresh juice in ophthalmic pain I find very useful; it checks the inflammation, if there be any" (D. Basu). In ear-ache, the fresh juice of the leaves is useful, a drop or two poured inside the ear (T. N. Ghose). In Mysore, the juice of the leaves is given once daily with curdled milk for gonorrhœa (North).

Scopolamine is the predominant alkaloid in the twigs and leaves, and the sole alkaloid in the fruits and roots of this plant grown in Assam. The results with the Indian plants resembled those obtained with European plants.

[Bull. Imp. Ins. 1911.]

The seeds contain about 10.9 per cent of fat and 0.149 of hyoscyamine.—

J. Ch. S. 1899 A. I. 829.

872. *D. alba*, Nees. H.F.B.I., IV. 243. Roxb. 188 (under *D. Metel*).

Vern.:—Safed-dhatura (H.); Dhuturâ (B.); Dhotara (Mar.); Dholo dhaturu (Guz.); Umattai (Tam.); Ummetta, dhutturâmu (Tel.); Unmatte-gidâ (Kan.); Ummatta, ummam (Mal.)

Habitat:—Throughout India.

Flowers white or nearly so. Trimen observes thus:—"Linnæus referred the Indian and Ceylon plant to his *D. Metel*, but the two species are scarcely separable," Vol III, p. 239. London 1895.

Uses:—In Hindu medicine, the root of *D. alba* is boiled in milk, and this milk is administered with clarified butter and treacle in insanity. The seeds, leaves and roots are considered useful in insanity, fever, with catarrhal and cerebral complications, diarrhoea, skin diseases, lice, &c. (Dutt).

It is officinal in the Pharmacopeia of India.

Epithems of the bruised leaves, or embrocations formed by macerating the bruised seeds in any bland oil, are often very effectual in allaying the pain in rheumatic swellings, nodes, boils, and tumours (Ph. Ind.).

873. *D. Metel*, Linn. H.F.B.I., IV. 243.

Vern.:—Dhutura (B.).

Habitat:—W. Himalaya and Mts. of W. Deccan Peninsula.

Use:—Used like the preceding species.

Datura Metel contains scopolamine (hyoscyne) as almost the only constituent of alkaloidal nature. The leaves contain 0·55, the seeds 0·50, per cent of scopolamine.—J. Ch. S. 1905 A. I. 717.

The seed contains both hyoscyamine and scopolamine.—J. Ch. I. 15. 2. 1911, p. 152.

The Indian plant (seeds and leaves) contains considerably less alkaloid than the European plant (0·23-0·25 as compared with 0·50-0·55); in one sample scopolamine was the predominant alkaloid as in the European plant, but another sample contained more hyoscyamine than scopolamine.—[Bull. Imp. Inst. 1911].

In his "Poisonous Plants of Bombay," Lieut.-Colonel Kirtikar writes:—

"The active principle of the plant is an alkaloid once known as Daturine. The seed contains it in larger proportions than any other part of the plant weight for weight. The alkaloid was also known at one time as Daturia. Sohn says that commercial Daturine is frequently a mixture of Hyoscyamine and Atropine or the former solely. *Datura stramonium*, he says, also contains Stramonine which is an alkaloid like Hyoscyamine and Atropine, but it is not bitter. Hyoscyamine has a sharp and disagreeable odour; Atropine has a disagreeable metallic taste.* Ehrhardt and Pöchl dispute the identity of Atropine and Daturine, says Sohn. Professor Dragendorff says† that "according to the more recent researches of Ladenburg, henbane contains two

* See p. 14, Sohn's Dictionary of the Active Principles of Plants, 1894, London.

† Plant Analysis—English Translation by Greenish, p. 60, 1884, London.

alkaloids, one of which Hyoscyamine, is isomeric with Atropine, and identical with Daturine and Duboisine." Ladenburg distinguishes Hyoscyamine from Atropine by the melting-points of the alkaloids, and their gold-salts. Professor Schmiedeberg of the University of Strassburg says* that Atropine occurs in Daturine of the Thorn-apple; Hyoscyamine, which is isomeric with Atropine is also said to be contained in the Thorn apple. But he doubts the identity of Duboisine with Hyoscyamine †. Dymock and his collaborateurs who have carefully examined the plant, say that Prof. E. Schmidt and Mr. Schute have found, as the result of their researches, that the seeds of *D. stramonium* contain much Hyoscyamine, with small quantities of Atropine and Hyoscyne (Apoth. Ztg., 1890, 511). Stramonine is not mentioned along with these. But in Dymock's *Ph. Indica* it is stated that M. Gerard has prepared a new fat acid, Daturic acid, from the seeds, which yield 25 per cent. oil when extracted by ether. Purified with petroleum, this oil is of a peculiar greenish-yellow colour. M. Gerard places Daturic acid between Palmitic and Stearic acids. They have analogous properties. Daturic acid crystallizes by cold from 85 per cent. alcohol giving groups of fine needles. It is fairly soluble in cold alcohol and very soluble in ether and benzene. * * *

Dr. Murrell says that according to the old classification the active principles were as follows:—

1. Belladonna contained Atropine.
2. Hyoscyamus—Hyoscyamine and Hyoscyne.
3. Stramonium—Daturine.

II A Manual of Pharmacology and Therapeutics. Pages 430—452, London, 1896.

"Ladenburg," adds Dr. Murrell, "has re-investigated the matter and says there are only three natural mydriatic alkaloids, * They are as follows:—

1. *Atropine*—which occurs in *Atropa belladonna*, and in *Datura stramonium*. (I may add in the Indian *Datura*, varieties and species of all *Datura* plants. K. R. K.)
2. *Hyoscyamine*—which occurs in *Belladonna*, *Datura*, *Hyoscyamus*, and *Duboisia myoporoides*.
3. *Hyoscyne*—which occurs in *Hyoscyamus*.

Duboisine is identical with *Hyoscyamine*; and *Daturine* is a mixture of *Atropine* and *Hyoscyamine*.

N. B.—I am all at sea here, for Sohn, whom I have quoted above, says that the *Datura stramonium* contains *Atropine*, *Hyoscyamine*, *Hyoscyne*, and *Stramonine*. The reader may accept the views of any of the pharmacologists I have cited above.

Dr. Murrell says that *Atropine*, *Hyoscyamine*, and *Hyoscyne* are isomeric,

* Elements of Pharmacology, Dixon's English Translation. Edinburgh 1887.

† Pharmacographia Indica, p. 588, Vol. II., 1891, Bombay, by Dymock, Warden and Hooper.

each answerable to the formula $C^{17} H^{23} N O^3$. They can all three be resolved thus :—

1. *Atropine* yields tropic acid and tropine (base);
2. *Hyoscyamine* yields the same, i.e, tropic acid, and tropine (base);
3. *Hyoscyne* yields tropic acid, and pseudo-tropine,

Note here, that in chemical parlance, *Atropine* is a compound of a base called *Tropine* and *Tropic acid*. *Ladenburg* calls the compound *Tropeine*."

874. *Scopolia lurida*, Dunal. H.F.B.I., IV. 243.

Syn. :—*Physalis Stramonifolia*, Wall.

Habitat :—Central Himalaya, Nepal and Sikkim.

An erect, glabrescent herb. Branches 3-6ft., sparingly divided, rusty-tomentose when young, later puberulous or glabrate. Leaves 8 by 3 in., acute at both ends, ovate lanceolate, ultimately glabrate; petiole $\frac{1}{2}$ in., peduncles 1 in. Calyx in flower $\frac{2}{3}$ in., in fruit attaining to 2 by $1\frac{1}{4}$ in., lobes short, irregular. Fruit Calyx rather reticulated. Corolla $1\frac{1}{4}$ by $\frac{3}{4}$ in., lurid yellow or greenish purple. Ovary 2 celled, 1-celled near the top. Capsule $\frac{3}{4}$ in., lid 1-celled.

Use :—A tincture of the leaves, in the proportion of one ounce to eight ounces of alcohol, administered produces dilatation of the pupil. The subject demands further investigation (Ph. Ind.)

It has been examined by Siebert. (*Archiv. der Pharm.* Feb. 20, 1890, p. 145.) From flowering plants he reports that he obtained, by fractional precipitation of an acidulated liquid with gold chloride, a "not inconsiderable quantity of hyoscyamine," but no atropine or hyoscyne, while from plants collected when the seed had ripened, only a very small quantity of atropine could be isolated under the same conditions and no hyoscyamine. The failure to detect hyoscyne is thought to be possibly due to insufficiency of the material used. These results seem to indicate that the degree of development of the plant may have an important relation to the quantity and nature of the alkaloids occurring in it. (*Pharm. Journ.* Mar. 1st, 1890, p. 709.)

875. *Physochlaina præalta*, Hook. f. H.F.B.I., IV. 244.

Habitat :—N. Kashmir and Western Tibet.

Vern. :—Sholar, bajar-bang, nandru, dandarwa, lang thang, khardag (Pb).

An erect, nearly glabrous, herb. Stems 2-4ft., corymbose upwards. Leaves 4-6 by 3in., irregular, ovate-oblong, sinuate, base cuneate or cordate on the same branch. Petiole 1-4in., corymb 2-8in. diam., compound, lax, viscid, pubescent. Flowers all pedicelled; pedicels $\frac{1}{4}$ -1 $\frac{1}{2}$ in. Calyx in flower $\frac{1}{8}$ in., lobes $\frac{1}{8}$ in. lanceolate; in fruit 1 $\frac{3}{4}$ by $\frac{1}{8}$ in., striate. Corolla 1 $\frac{1}{2}$ by $\frac{3}{4}$ in., tubular, funnel-shaped in the majority of wild examples, sometimes shorter (C. B. Clarke), in the cultivated examples wider, subcampanulate. Stamens and styles equalling the Corolla, or $\frac{1}{2}$ in. longer, distinctly exserted in all wild examples. Capsule $\frac{1}{2}$ in. diam. Seeds $\frac{1}{2}$ in. diam., scorbiculate-reticulate.

Uses:—"In the hills the leaves are applied to boils, and are also said to be poisonous, the mouth swelling from their touch, and the head and throat being affected when they are eaten. A man was poisonously affected by eating the plant gathered in the Lahoul habitat, and the Negi of Lahoul, when at Leh in 1867, suffered from its narcotic effects for two or three days, some of its leaves having been gathered by mistake with his *ság*. At the same time, they can hardly be very poisonous to all animals, for in Lahoul they are browsed by cattle. In a recent communication to the Agri-Horticultural Society of India, Dr. Christison of Edinburgh states that this has the same property of dilating the pupils as Belladonna" (Stewart).

876. *Hyoscyamus niger*, Linn. H.F.B.I., IV. 244.

Vern.:—Bazrul; Khorasani ajowan (B. and H.); Kurashani Yomam (Tam.); Kurásani-vamam (Tel.).

Habitat:—Temperate Western Himalaya, from Kashmir to Garwhal.

An erect, coarse herb, pubescent and more or less hairy. Leaves cauline, sessile, ovate or oblong, sinuate or lobed 5 by 2in. Flowers subsessile. Lower pedicels in fruit scarcely $\frac{1}{8}$ in. Calyx in flower $\frac{2}{3}$ in., softly hairy, teeth mucronate, short, triangular, somewhat rigid, the fruit 1 by $\frac{1}{2}$ in., subcontracted in the middle. Corolla purple in the base, lin., lurid green,

reticulate, nerved, purple. Capsule $\frac{1}{2}$ in. diam. Seeds $\frac{1}{2}$ in. diam. (C. B. Clarke).

Officinal in both Pharmacopeias.

The Chemical results agreed with those obtained with the European plant. Leaves, 0.062; seeds, 0.081 per cent. of total alkaloid.—[Bull. Imp. Inst. 1911].

The seeds yield about 35 per cent. of oil, which is yellow, slightly fluorescent, somewhat viscous, and dries readily.

877. *H. muticus*, Linn. H.F.B.I., IV. 245.

Syns.:—*H. insanus*, Stocks.

Habitat:—West Punjab and Scinde.

Erect coarse herbs. Stem 1-3ft. Leaves 9-4in., pubescent or somewhat woolly. Cauline leaves petioled, ovate or oblong, entire toothed. Petioles $\frac{1}{4}$ -3in. Lower flowers pedicelled. Lower pedicels in fruit $\frac{1}{4}$ -1in. Calyx striate pubescent, $\frac{2}{3}$ in., in fruit 1 by $\frac{1}{2}$ in., funnel-shaped, ribbed, somewhat reticulate, villous or ultimately glabrous. Calyx-teeth short-triangular, not acute in fruit, Corolla 1-1 $\frac{1}{2}$ in., lurid yellow or nearly white. Capsule $\frac{1}{4}$ in. diam. Seeds $\frac{1}{2}$ in. diam.

Uses:—A common plant of Baluchistan, where it is known by the name of *Kohi bung* or *Mountain Hemp*. Its powerfully poisonous properties are well known, and it is stated to be smoked in small quantities by debauched faquirs, and to be used also for criminal purposes. The chief symptoms produced by it are dryness and constriction of the throat, and furious delirium (Stocks in Hooker's Journ. of Bot., 1852. vol. iv., p. 178).

The alkaloid in this is chiefly, if not entirely, hyoscyamine, which possesses mydriatic properties which can be very easily isolated.

Similar to atropine is another well known mydriatic alkaloid of wide use, viz.:—hyoscyamine—which is obtainable from the *Hyoscyamus niger*—the henbane of the English country lane. The writer recently had occasion to analyse sample of Indian *Hyoscyamus* (probably the *Hyoscyamus muticus*—an allied species of the genus *Hyoscyamus*) grown in the Punjab where large quantities of the plant occur in the wild state along the river sides. The assay showed the dried plant to contain the very high amount of 0.827 per cent. of mydriatic alkaloids. This is very much richer than the English

henbane, in fact it is nearly ten times as strong. Specimens of Indian henbane have been known to contain as much as 1.28 per cent. of alkaloid and unlike the English variety *Hyoscyamus niger* which contains the alkaloids hyoscyamine, hyoscyne, and scopolamine the Indian variety *muticus* is said to contain only hyoscyamine. As a source of this important alkaloid hyoscyamine Indian *Hyoscyamus* should receive the attention of the manufacturer of fine chemicals and drugs.

For the information of those readers of the Journal who are interested in the chemistry of this subject or the manufacture of hyoscyamine, below are given the details of the method of assay used, which is a modification of that devised by Rupp. *Pharm. Zeit.* 1908, 728; *Chem. Zeit. Rep.* 1908, 32, 529; *Pharm. J. Russ* 1911, 138; *J. Pharm. Chem.* 1911, 3,551). The method can be used for assaying extracts of belladonna also.

Twenty-five grams of the powdered leaf are extracted with 300 cc. hot alcohol Sp. Gr. 0.829 in a Soxhlet tube (4 times was found sufficient to exhaust the leaves and obtain a washing free from alkaloids). The alcoholic extract is evaporated until a sticky brown mass is obtained. This is weighed and the weight noted. Six grams of the extract so obtained is weighed into a stoppered flask. About 5 cc. of water, 90 grams of ether and one gram of ammonium hydrate are then added and the mixture shaken for 15 minutes. After separation 60 grams of the clear ethereal layer is filtered off and the solvent evaporated. The residue is then treated with 5 grams of ether and again evaporated to dryness. This is repeated three times, each time with 5 grams ether. The residue is then dissolved in 5 grams of alcohol 70 per cent. and the solution transferred to a graduated 100 cc. flask.

The first flask is washed out with another 5 cc. of alcohol 70 per cent. and then with water. To the bulked washings is added 20 grams of sodium chloride and 20 cc. of N/100 HCL are added with sufficient water to bring the whole contents up to 100 cc. After thorough agitation the solution is filtered. 50 cc. of the filtrate is transferred to a stoppered flask. 30 cc. of ether and 5 drops of Iodeosine indicator are added. The excess of hydrochloric acid is then determined by titration with N/100 KOH in the usual manner.

In the meantime a blank experiment with the same reagents but without any extract of the leaves, is performed to obtain the correcting factor for reagent impurities, and this is deducted from the above titration figure. This precaution is absolutely necessary as a correction of upwards of 2 cc. of N/100 HCL is frequently found.

Each cc. of N/100 HCL used by the alkaloids = 0.00289 of mixed alkaloids as hyoscyamine.

This is not the first time that Indian *Hyoscyamus* has been examined, for Dunstan and Brown examined a specimen (*J. C. S.* 1899, 75,72), but only 0.1 per cent. of alkaloid was then recorded. It is possible that more than one variety of *Hyoscyamus* exist and that the alkaloidal contents of the varieties differ considerably. It is also more than likely that the amount of active principle present will depend upon the age and condition of the plant, for Godamer (*Arch. Pharm.* 1898, 28), has shown that in *Hyoscyamus muticus* the

stalk contains 0.49 per cent., the leaf 0.9 per cent., and the seed capsule 0.585 per cent. of alkaloid.

Previous to the outbreak of the present war not only was a large proportion of the drug grown in Germany but German chemists practically held a monopoly for the manufacture of the alkaloid.

If then the supply of this substance falls short of the demand, English manufacturing chemists can obtain an adequate supply of the raw material from Northern India, for the plant can be exported in the dry state without impairing its value for alkaloidal manufacture.—J. H. BARNES.) *The Agricultural Journal of India*, January, 1916 pp. 86-88.

878. *H. reticulatus*, Linn.

Vern.:—Khorasani Ajowan (H.).

Habitat.:—Baluchistan. It grows abundantly in Quetta.

It differs from the species mentioned above in having a prickly stem, flowering bordering on purple and a black seed.

Use:—It is used like other species of *Hyoscyamus*, for it contains Hyoscyamine.

Seeds, 0.082; whole plant (1), 0.240, (2) 0.116 per cent. of total alkaloid. Hyoscyamine was the only alkaloid that was identified.—[Bull. Imp. Inst. 1911].

879. *Nicotiana Tabacum*, Linn. H.F.B.I., IV. 245.

Vern.:—Tamâkú (Hind.); Tanbak (Arab.); Tanbâku (Pers.); Tâmak (Beng.); Tâmrakûta (Sans.); Tamâkú, tamâqú (Dec.); Pugai-ilai (Tam.); Pogâku, dhûmrapatramu (Tel.); Puka-yila, pokala (Mal.); Hôgesappu (Kan.); Tamâku (Guz.); Dungazha, ðimkôla (Cingh.); Sé (Burm.); Tambâkhu (Bom.).

Habitat:—Cultivated throughout India.

Erect, viscidly-pubescent herbs, shrubs or trees. Leaves sinuate entire, large, oblong, elliptic; base cuneate, corymb compound, ultimate branches short. Panicles terminal, or racemes compound subterminal. Calyx ovoid or tubular, 5-fid. Calyx-teeth triangular-lanceolate. Corolla linear funnel-shaped. Corolla lobes 5, in duplicate in bud. Stamens attached in the lower part of the Corolla-tube, filaments filiform; anther ovate, dehiscing longitudinally. Ovary 2-celled; style filiform, stigma shortly 2-fid. Capsule $\frac{3}{4}$ in. 2-rarely sub-4 celled, 2-valved to the

middle, valves often again splitting. Seeds very many, small, scarcely compressed. Embryo nearly straight.

Official in both Pharmacopeias.

The seeds of tobacco yield on pressing 9 to 10 per cent., and by extraction, 30 to 32 per cent of a greenish-yellow oil. It is said to have strong drying powers. The fatty acids are stated to consist of 25 per cent. of oleic acid, 15 per cent. of linolic acid. 32 per cent of palmitic acid, and a small quantity of stearic acid.

880. *N. rustica*, Linn. H.F.B.I., IV. 245.

Vern.:—Chilássi tamáku, kukkar, tamákû (Pb. and Hind.).

Habitat:—A native of Mexico, cultivated in Europe, Asia, Africa and America.

It differs from *N. Tabacum* in its smaller stature, its sub-orbicular leathery leaves, and in the greenish-yellow flowers, the segments of which are much shorter.

Used like the preceding.

N. O. SCROPHULARINEÆ.

881. *Verbascum Thapsus*, Linn. H.F.B.I., IV. 250;
Roxb. 188.

English:—"Great Mullein."

Vern.:—Vúlr, phúl; bantamáku, phásrúk, bhum ke dhúm, eklbir, kadanda, phúntar, kwispre, khargosh, khar kharuar, spin kharuár, gurganna, karâthri, ravand chini (Pb.); Gidar tamáku. (H.).

Habitat:—Temperate Himalaya, from Kashmir to Bhotan.

A densely woolly eglandular herb. Stem simple, stout, 2-3ft. Root-leaves 6-18in; cauline oblong, upper acuminate, oblanceolate, very decurrent, entire or crenate. Spikes simple, dense woolly, 6-10in. Bracts longer than the flowers. Stamens 5, fertile, 2 glabrous and three with white hairs. Fruit a capsule. Seeds numerous, not winged.

Uses:—In Bassahir, the root is given as a febrifuge. The name *rewand chini* of this plant seems to indicate that it is

sometimes used to adulterate rhubarb (Dr. Stewart). *Digitalis* leaves are occasionally found mixed with those of *Verbascum Thapsus* and of other plants (Garrod.)

The seeds are supposed to be narcotic and are used for poisoning fish (O'Shaughnessy). Mr. Duthie's Trans-Indus collector states that the herb is much employed by the natives of that region for the treatment of asthma and other pulmonary complaints, that it possesses narcotic properties similar to those of tobacco, and that the seeds are considered aphrodisiac. The leaves warmed, and rubbed with oil, are employed as an application to inflamed parts. In Europe and the United States of America, the thick woolly leaves were at one time much valued as demulcents and emollients, not only in domestic medicine, but by practitioners. They were used in the treatment of catarrh and diarrhoea, and as an external application for hæmorrhoids (Watt).

It was formerly used in medicine on account of its emollient properties. A decoction of the leaves was recommended by the physicians of the last century for diarrhoeas. Sir James Smith says :—

'That a pint of cow's milk, with a handful of the leaves of this Mullein boiled in it to half a pint, sweetened, strained, and taken at bed time, is a pleasant, emollient, and nutritious medicine for allaying a cough, or removing pain and irritation.'

It is one of the many herbs said to poison, or rather to stupefy fish. According to Alexander Trallianus, its ashes made into a soap will restore hair which has become grey, to its original color.—(Sowerby's Eng. Bot., Vol. vi, pp. 111-112).

The *British Medical Journal* of 27th January 1883, published an interesting paper from the pen of Dr. F. J. B. Quinlan of Dublin on the use of this plant in the treatment of pulmonary consumption. According to him, this plant which is a wild one in Ireland is a trusted popular remedy for that malady. After describing several cases in which this plant proved useful, he says :— "That it eases phthisical cough there can be no doubt.** Its power of checking phthisical looseness of the bowels was very marked.** It also gave great relief to the dyspnoea. For phthisical night sweats it is utterly useless."

In another note (B. M. J. Feb. 9, 1884 p. 294), he writes "The quantity of mullein is three ounces of the green leaves, which should be boiled for

ten minutes in a pint of new milk. This should be strained slightly sweetened with lump sugar, and drunk warm. This quantity should be taken twice or three times a day, and is liked by the patients. There is no doubt of its efficacy as a curative in the earlier, and a palliative in the later stages of pulmonary consumption."

Again, in the B. M. J. for April 5, 1884 p. 664, he mentions the control of phthisical cough by smoking the dried leaves of the mullein plant in an ordinary tobacco pipe.

Chemical composition.—Morin (*Journ. Chin. Med.* ii, p. 223) obtained from the flowers a yellow volatile oil, a fatty acid, free malic and phosphoric acids, malate and phosphate of lime, acetate of potash, uncrystallizable sugar, gum, chlorophyll, and a yellow resinous colouring matter.

Adolph Latin submitted the leaves to proximate analysis and found the constituents to be 0.80 per cent. of a crystalline wax, a trace of volatile oil, 0.78 per cent. of resin soluble in ether, 1.00 per cent. of resin insoluble in ether, but soluble in absolute alcohol, a small quantity of tannin, a bitter principle, sugar, mucilage, &c. The moisture in the air-dried sample amounted to 5.90 per cent., and the ash to 12.60 per cent. He concludes that the plant contains many of the usual constituents, and a bitter principle which may be prepared by exhausting the drug with alcohol, dissolving the alcoholic extract in water and agitating with ether or chloroform. Several trials failed to secure this substance in a crystalline condition. It was found to be soluble in water, ether, alcohol, and chloroform, and to possess a decidedly bitter taste. It responded to none of the tests for a glucoside or alkaloid. (*Am. Journ. Pharm.*, Feb. 1890. E. L. Janson (1890) found that petroleum ether and stronger ether used successively, extracted from the flowers about $\frac{1}{2}$ per cent. in each case. A decided change in the colour of the drug was noticed after the extraction with ether, which removed the yellow colour, leaving the residue of a dark green. The yellow colouring matter was either a part of, or else it was retained by the resin dissolved by ether, and it was not found possible to separate it in the pure state. The drug after exhaustion with ether yielded 10.06 per cent. to absolute alcohol. A considerable portion of this alcoholic extract was soluble in water acidified with hydrochloric acid. When agitated with petroleum ether the acid solution yielded some colour to it, and this latter solvent on evaporation left a greenish-brown crystalline mass of a strong disagreeable odour and a sweet taste, which proved to be an easily decomposable glucoside. Another crystalline extractive was obtained by making the above acid solution of the alcoholic extract alkaline and agitating with ether; while chloroform subsequently extracted a red-brown amorphous mass.

Both of these extractives reduced Fehling's solution, and many changes in colour were noticed, indicating that these substances take some part in the colouring matter of the flowers.

The drug was also found to contain 2.49 per cent. of mucilage, 11.76 per cent. of carbohydrate corresponding to dextrin, 5.48 per cent. of glucose, 1.29 per cent. of saccharose, 16.76 per cent. of moisture, 4.11 per cent. of ash, and 32.75 per cent. of cellulose and lignin. No reaction indicating tannin was

obtained with iron salts, but an aqueous solution of the alcoholic extract yielded a slight precipitate with gelatin. The seeds yielded to petroleum ether 20·75 per cent. of a bright green fixed oil. The acrid principle was obtained from the alcoholic extract soluble in water by agitating with petroleum ether. The moisture was 10·86 per cent., and the ash 3·90 per cent. (*Amer. Journ. Pharm.*, Dec. 1890). (*Pharmacographia India*, III. 3-4).

882. *Celsia coromandeliana*, Vahl. H.F.B.I., IV. 251; *Roxb.* 491.

Sans.:—Kulāhala.

Vern.:—Kukshima (B.); Kutki (M.); Gaidar tambāku (H.); Kolhal (Bom.).

Habitat:—Throughout India, from the Punjab to Ceylon.

An annual herb, with alternate leaves. Stems 2-3ft., stout, hairy, branched at summit. Radical leaves on long petioles, compound or pinnatisect, with several small leaflets or segments at base and large oblong, oval, acute terminal one. Cauline leaves alternate, sessile, oblong-ovate, passing into bracts, all coarsely dentate, hairy on both sides. Flowers yellow, moderate sized, on slender, glandular, pubescent pedicels, in long erect racemes 1-2ft., terminating stem and branches; bracts leafy. Calyx-segments oblong, acute, glandular-pubescent. Corolla $\frac{1}{2}$ in. diam., lobes rounded. Filaments hairy. Capsule $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., subglobose, glabrous. Seeds oblong, truncate, verrucose.

Uses:—The inspissated juice of the leaves prescribed in several cases of acute and chronic dysentery with manifest advantage. Its action appears to be that of a sedative and astrigent (*Ph. Ind.*).

"Juice of the whole plant squeezed out by pounding it, is used in half *chittak* doses, morning and evening, in cases of syphilitic eruptions. The juice of the leaves, mixed with mustard oil, in equal proportions, is applied as an external application for relieving the burning sensations of the hands and feet" (*Surg. Mukerji*, in *Watt's Dictionary*).

"If a little of the root is chewed in fever, or when there is urgent thirst, a cooling sensation will occur and thirst be appeased" (*Surg. Wilson*, in *Watt's Dictionary*).

"Expressed juice of the leaves, mixed with sugar and water, used as a drink in bleeding piles" (*Dr. Shircore*).

"It is reputed to be an emetic and expectorant, being employed in capillary bronchitis of children. An Asst.-Surgeon tells me he has used it with good results in diabetes" (Surgeon French Mullen, in Watt's Dictionary).

883. *Linaria ramosissima*, Wall. H.F.B.I., IV. 251.

Habitat:—Throughout India, on rocks and stony places, from the Punjab and Scinde to Chittagong and Ceylon.

Perennial herbs, nearly glabrous. Branches 1-2 ft. long, prostrate, slender, filiform, numerous, spreading from the rootstock. Leaves alternate, membranous $\frac{1}{2}$ -2 in., petioled, ovate-cordate, sagittate. Pedicels capillary, longer than the petioles, 1-1 $\frac{1}{2}$ in. Flowers yellow. Sepals narrowly lanceolate. Corolla $\frac{1}{2}$ in. long, spur shorter than the Corolla-tube, hairy; upper lip shorter. Capsule with sub-equal lobes. Seeds minute, ovoid, scabrous.

Use:—Highly valued as a remedy for diabetes (Murray).

884. *Schweinfurthia sphærocarpa*, A. Braun. H.F.B.I., IV. 252.

Vern.:—Sonpât (Sind); Sanipât (H.).

Habitat:—Sindh, in rocky places.

A perennial, robust, glabrous or hairy herb. Branches 6-12 in. Leaves nearly always alternate, $\frac{1}{2}$ -1 $\frac{1}{2}$ in.; orbicular ovate or spatulate, fleshy, glaucous, obtuse or subacute, narrowed into a short petiole. Flowers small axillary. Pedicels very short. Sepals ovate-lanceolate, acute, $\frac{1}{3}$ in. long equalling the Corolla-tubes, enlarged in the fruit. Corolla dirty white. Filaments hairy at the base. Capsule $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. Seeds pale (J. D. H.).

Uses:—The drug which consists of the fruit and the powdered leaves, together with portions of the stem, has a slightly bitter, somewhat tea-like taste, and is prescribed by Native practitioners to patients suffering from typhoid symptoms. The powder is snuffed up for bleeding at the nose (Dr. Stocks).

In Hindu medical literature and in popular use, *San-nipata* is a term which signifies a combined derangement of the three humors, Vâta, Pitta, and Kafa (air, bile, and phlegm), which is supposed to produce *Sannipata-jvara*, or fever with typhoid

symptoms. The remedy for this condition is said to be a plant called Sannipata-nud, "driving away sannipát," and Nepálanimba, "Nepal Neem" or "Nepal bitter." At the present time the drug sold in the shops is *S. sphaerocarpa* but whether it is the original Nepal Neem is difficult to decide, as at present we do not even know whether this plant is found in Nepal. In typhoid conditions the drug is considered to act as a tonic, to promote diuresis, subdue fever, and remove the derangement of the humors. We are not aware of any experiments having been made with it by European physicians in India, though its near relationship with the Antirrhinums, which contain glucosides similar to those of *Digitalis*, would, we should have thought, have excited curiosity in regard to its physiological action." (Pharmacographia Indica, III. 5.)

Chemical composition.—The powdered drug treated with ether yielded a dark olive-green extract, consisting of chlorophyll and uncrystallizable fatty matter. Subsequent percolation with alcohol removed a deep brown extract, from which cubical crystals of alkaline chlorides separated on evaporation. An aqueous solution of this extract had a saltish taste and gave distinct precipitates with alkaloidal tests. The alkaloid was removed by ether in an amorphous condition, and gave no well-marked colour reactions with the strong mineral acids. By continuing the exhaustion of the powdered drug with water, a deep reddish brown extract was obtained having a bitterish and nauseous taste, and containing saccharine and other matters which readily fermented. In order to ascertain if the drug contained a substance similar to digitalin, a fresh decoction of the powder was filtered and precipitated by tannin, the precipitate washed, mixed with an excess of alkali, and shaken with ether. The result was the separation of an alkaloid similar to that previously found. As more recent investigators prepare digitalin by exhausting with alcohol after treatment of the drug with water, this process was adopted with *Schweinfurthia*. The resinous matter collected had an acrid taste, but no principle could be obtained possessing the properties of digitalin, digitonin or digitoxin, to which, according to Schmiedeberg, the poisonous qualities of *digitalis* are due. Besides the alkaloid, which we consider to be the active principle, the drug yielded 18.6 per cent. of mineral matter." (Pharmacographia Indica III. 6.)

885. *Lindenbergia urticæfolia*, Lehm. H.F.B.I.,
IV. 262.

Syn.:—*Stemodia ruderalis*, Vahl. Roxb. 4 90.

Vern.:—Dhol (Mar.) ; Gazdar (Bomb.).

Habitat:—Throughout India, on walls and banks.

An annual herb, 4-10in. high, brittle, slender, glandularly villous or glabrate. Stem sometimes simple; with all the flowers solitary in the axils of large leaves, at others branched, the branches running out into leafy racemes. Leaves 1-1½ (rarely 2½)in. long, membranous, obtuse, ovate, crenate-serrate, petiole ¼-¾in. Flowers shortly pedicelled unilateral, all axillary and solitary or 2-nate, or in lax, leafy, slender spikes or racemes. Calyx shorter than the ovate leafy bracts, ½in., lobes recurved. Corolla twice as long as the Calyx, sparsely hairy, yellow; ovary pubescent. Capsule hairy above the middle.

Use:—The juice is given in chronic bronchitis, and mixed with that of the coriander, is applied to skin eruptions. The plant has a faint aromatic odor, and a slightly bitter taste (Dymock).

886. *Stemodia viscosa*, Roxb. H.F.B.I., IV. 265; Roxb. 489.

Vern.:—Nukachuni (B.); Boda-sarum, gunta kaminam (Tel.).

Habitat:—From Central India and the Sone river throughout the Deccan.

An erect annual herb, viscidly pubescent, branched from the base, 6-18in. high, aromatic. Stem angular. Leaves ¼-2in. rarely ovate, sessile, oblong, base cordate serrulate, sometimes shortend, sometimes very small throughout the plant. Flowers pedicelled, axillary, and in terminal racemes, very numerous, nearly ½in. long, 2-bracteate. Bracts shorter than the pedicels; pedicels equalling or exceeding the Calyx. Corolla twice as long as the Calyx. Sepals lanceolate, acute, half as long as the violet Corolla. Anther-cells all polleniferous. Capsule ¼-in-½. long, equalling the Calyx, acuminate. Seeds ellipsoid, terete, black, or, brown, most minute.

Use:—The dried plant, which is slightly fragrant and mucilaginous, is used by the natives of Bengal in infusion as a demulcent (Irvine).

887. *Limnophila gratissima*, Blume. H.F.B.I., IV 268.

Vern.—(To this as well as the next species are applied the following names in common.):—

Kuttra (H.); Karpur (B.); Ambuli (Mar.); Manga-nâri (Mal).

Habitat.—Watery places. Cachar, Pegu, Malacca, The Decan Peninsula, from the Concan southwards.

Glabrous herbs growing in water or marshy places. Stems stout, erect, simple, 1-2 ft., rarely branched above. Leaves $1\frac{1}{2}$ -2 $\frac{1}{2}$ in., opposite and 3-nately whorled, $\frac{1}{2}$ amplexicaul, linear-oblong, subacute, serrulate nerves few and faint. Racemes rarely solitary, sometimes 1 ft. long and paniculately branched, with flowers whorled, at others few-fid, or flower solitary and axillary. Pedicels $\frac{1}{2}$ -lin., glandular; bracteoles minute. Calyx $\frac{1}{3}$ in. long, glandular, fruiting, striate, hemispheric, lobes lanceolate, acuminate. Corolla $\frac{1}{2}$ in. long. Capsule oblong, acute.

Use.—It is used medicinally as a cooling medicine in fever, and given to women who are nursing, when the milk is sour. (Pharmacographia Indica, Vol., III., p. 7).

888. *L. gratioloides*, Br. H.F.B.I., IV 271.

In the *Fl. Br. Ind.* are described two varieties, 1. *intermedia* and 2 *elongata*.

Sanskrit:—Ambuja, "water born," and Amra-Gandhaka, having an odour of mangoes.

Vern.:—The same as of the above species.

Habitat.—Throughout India, in swamps, rice-fields.

"In its most common form," says Sir J. D. Hooker, "a simple or branched, plant, 4-8 in. high, smelling of turpentine, with whorled pinnatifid leaves, $\frac{1}{4}$ - $\frac{3}{4}$ in. long, which in wetter places appear to acquire a few emersed opposite entire leaves at the top of the stem and numerous capillaceo-multifid ones at its base. The stems are stout and slender." Flowers axillary, solitary, pedicelled, rarely subracemose. Calyx $\frac{1}{2}$ - $\frac{1}{3}$ in. long, rarely larger, hemispheric in fruit, lobes ovate acuminate, not striate, Corolla $\frac{1}{2}$ in.

Uses :—It is considered to be antiseptic by the Hindus, and its juice is rubbed over the body in pestilent fevers. Rheede notices its use for this purpose, and also internally in dysentery combined with ginger, cumin, and other aromatics. He also states that a liniment is made from the plant with cocoanut oil which is used in elephantiasis. Roxburgh, under the name of *Calumnea balsamea*, describes the plant and notices its grateful odour and aromatic taste. The Bengal name signifies "Camphor." The odour of the fresh plant is remarkably refreshing and agreeable and calls to mind that of camphor and oil of lemons. (*Pharmacographia Indica*, III—7).

889. *Herpestis Monniera*, H. B. and K. H.F.B.I., IV. 272.

Syn. :—*Gratiola Monniera*, Linn. Roxb. 47.

Vern. :—Brahmi, jal-nim, shwet chamni (Hind.); Adhabirni (Beng.); Urishnaparni (Uriya); Bâma, Nirbrâhmi (Bom.); Beami nirpirimie (Tam.); Sembranichitîû (Tel.).

Habitat :—Common in marshes throughout India, from the Punjab to Ceylon.

Marshy glabrous, often punctate herbs; creeping, rather succulent; branches 4-10 in. long, rooting at the joints. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in. opposite, fleshy, sessile, obtuse, entire in the Indian plant, ovate-oblong or spathulate; nerves very obscure; lower surface dotted. Peduncles usually longer than the leaves, and 2 bracteole. Flowers pale blue, purple-veined, single on alternate, axillary stalks. Calyx $\frac{1}{4}$ - $\frac{1}{2}$ in. long, 5-parted, upper sepal ovate, Corolla cylindric, twice as long; lobes and stamens subequal, anthers sagittate or didynamous; style linear; stigma capitate, 2-lobed capsule included, ovoid, acute. Seeds pale, irregular, numerous.

Parts used :—The root, stalks and leaves.

Uses :—It is considered by the Hindu physicians a nervine tonic, useful in insanity, epilepsy and hoarseness (Dutt).

It is regarded by the Hindus as a powerful diuretic and aperient (Ainslie, *Mat. Ind.*, vol. ii, p. 239), but there is no trustworthy evidence of its value in these respects. According

to Roxburgh) *Flor. Ind.*, vol. i. 141), the juice of the leaves, conjoined with petroleum, is used in India as a local application in rheumatism. Whatever benefit is derived from this formula is doubtless due to the petroleum (Ph. Ind.).

A teaspoonful of the juice of the leaves given to infants suffering from catarrh or severe bronchitis gives relief by causing vomiting and purging. (Dr. U. C. Dutt, in Watt's Dictionary).

In Pondicherry It is considered to be aphrodisiac, and in Ceylon, under the name of *Loonoowela*, it is prescribed in fevers.

For the analysis the whole plant was used, dried at a low temperature and exhausted with 80 per cent. alcohol. The alcohol freed extractive was then agitated with petroleum ether; ether from an acid solution, and again with ether from an alkaline solution, and finally with chloroform from an alkaline solution. Operating in this manner, a trace of oily matter was obtained, soluble in alcohol with acid reaction; two resins, one easily soluble in ether, the other soluble with difficulty, but both soluble in alkaline solutions and reprecipitated by acids; an organic acid, and a tannin affording a green coloration with ferric chloride. An alkaloidal principle was also isolated, soluble in ether and in chloroform, and affording a cherry red coloration in the cold with Frehde's reagent. No other reactions were noted. (Pharmacographia Indica, III, 9).

890. *Curanga Amara* Juss. H.F.B.I. IV. 275.

Habitat —Sikkim Himalaya; Assami; Mishmi; Cachar; Chittagong; Tenasserim.

A glabrous, diffuse annual. Branches slender, straggling, divaricate, rooting at the lower nodes, 2-3ft. long. Leaves 2-2½ in., obtuse or acute; petiole ½ in., slender. Racemes short, few-fid; pedicels ¼-½ in. Calyx in flower ¼ in., in fruit ½ in. Outer sepals broadly ovate-cordate, membranous, reticulate. Corolla red brown. Capsule ½ in. diam., compressed. Foliage very bitter.

Use.—It is used as a febrifuge.

The bitter febrifuge Curangin, $C_{43}H_{77}O_{20}$, may be extracted by means of ethylacetate. This glucoside is easily soluble in ethyl or methylalcohol, or in acetone or ethylacetate containing water; 100 parts of water dissolve 0.18 part. The solutions are neutral. When heated at 100°, curangin loses 7-10 per cent of water, but the residue regains this amount on exposure to air. By the action of benzoyl chloride and sodium hydroxide solution, it forms

a compound, $C_{43}H_{69}O_{20}Bz_3$, which melts at 128° , and with phenyl-hydrazine it yields a compound which contains nitrogen and melts at 163° . Attempts to prepare bromide failed, as the hydrogen bromide which is formed decomposes the glucoside. When curangin is boiled with a 2 per cent. solution of hydrogen chloride in alcohol, it is decomposed into curangaegenin and a sugar, which appears to consist mainly of rhamnose.

The crude curangaegenin contains two compounds, of which the one (A) present in the larger quantity is soluble in ether, and is apparently partially converted into the other (B) by prolonged boiling with the alcoholic acid solution. (B) is insoluble in ether. Both substances are easily soluble in ethylacetate, acetone, glacial acetic acid, or methyl, ethyl, or amyl alcohol." J. Ch. S. 1903 A. I. 243.

Curangaegenin, $C_{30}H_{47}O_7$, does not contain methoxy-groups. The formula was confirmed by molecular weight determinations. Curangin is either non-poisonous or only very slightly poisonous. (J. Ch. S. 1900. A. I. 304.)

891. *Torenia asiatica* Linn. H.F.B.I., IV. 277.

Vern :—Kākupu (Mal.).

Habitat :—Western Peninsula, and the Neilgherry Mts.

Nearly glabrous or pubescent herb, diffusely branched; creeping below. Branches 6-10 in. long, slender. Leaves $1\frac{1}{2}$ -2 in., ovate-cordate or lanceolate, serrate, acuminate; petiole short rarely more than $\frac{1}{4}$ in. Pedicels axillary and subumbellate, fruiting thickened. Calyx tubular, fruiting lin., narrowly oblong, keeled, hardly winged; base decurrent. Corolla $1\frac{1}{4}$ - $1\frac{1}{2}$ in., blue, with very dark violet lateral lobes. Longer filaments toothed. Stigma 2-lamellate.

Use :—The juice of the leaves is considered on the Malabar coast a cure for gonorrhœa (Rheede).

892. *Vandellia erecta*, Benth. H.F.B.I., IV. 281.

Vern. :—Vaka-pushpi or "crane flower" (Mar.).

Habitat :—Throughout India, from Kashmir to Assam, Tennasserim and the S. Deccan.

Erect, quite glabrous, annual herbs, branched from the base; branches divaricate, not rooting, 4-8 in. high. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in., sessile, elliptic or oblong. Pedicels very slender, usually twice as long as the leaves. Sepals $\frac{1}{4}$ - $\frac{1}{2}$ in. long, rather obtuse, lanceolate or linear rather shorter than the ovoid orbicular capsule.

Use :—Used in a ghr̥ita as a remedy for gonorrhoea, and the juice is given to children who pass green-colored stools (Pharmacographia Indica, iii. 14).

893. *V. pedunculata*, Benth. H. FL. BR. I. IV. 282.

Vern. :—Gadagvel (Mar.).

Habitat :—Throughout India.

A glabrous, annual herb. Stem sometimes creeping at the base and rooting from the nodes, sometimes tinged with purple. Branches 4-10 in. long, procumbent, slender. Leaves shortly petioled, $\frac{1}{2}$ -lin., obtuse or subacute, obscurely crenate, toothed. Flowers solitary, axillary; pedicels as long as the leaves sometimes $1\frac{1}{2}$ in., Sepals $\frac{1}{4}$ in., narrowly lanceolate. Corolla $\frac{3}{8}$ in. long white, or pale blue with a white spot. Longer filaments, with a small obtuse tooth. Capsule $\frac{1}{3}$ in., much longer than the Calyx linear lanceolate. Seeds ellipsoid.

Use. :—It is used for the same purpose as *V. erecta*.

894. *Picrorhiza Kurrooa*, Benth. H.F.B.I., IV. 290.

Sans. :—Katuka; Katurhini.

Vern. :—Katki (B. and (H.); Karrû (Pb.); Kâli kutaki, bâlakadû (Bom.); Kutki (Mar.); Kadu (Guz.); Kâli-kutki (Dec.); Katuku-vogani (Tam.); Katuku-roni; Kâtuka-rohani (Tel.).

Habitat :—Common in Alpine Himalaya, from Kashmir to Sikkim.

A low, more or less hairy, herb, with perennial woody bitter stock. Root-stock as thick as the little finger, 6-10 in. long, clothed with withered leaf-bases. Leaves subradical, spathulate, serrate, 2-4 in., rather coriaceous, tip rounded, base narrowed into a winged sheathing petiole. Flowering stems or scapes ascending, stout, longer than the leaves, naked or with a few bracts below the inflorescence. Spikes 2-4 in. long subcylindric, obtuse, many-flowered, subhirsute; bracts oblong or lanceolate, as long as the Calyx. Sepals $\frac{1}{4}$ in. long, ciliate.

Corolla of short stamened form, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, with longer filaments $\frac{1}{2}$ in. long, of the longer stamened form $\frac{1}{2}$ in., with filaments $\frac{3}{4}$ in. long. Capsule $\frac{1}{2}$ in. long.

Uses:—By the Hindu writers, the root is described as bitter, acrid and stomachic and in large doses a moderate cathartic. It is used in fever and dyspepsia in many purgative preparations. About two drachms of the powdered root, with sugar and warm water, act as a gentle aperient (Dutt).

"From my experience of the root of *P. Kurroa*, I can say that it is a good stomachic and very useful in almost all forms of dyspepsia and in nervous pain of the stomach and bowels. Doses, as an antiperiodic, from 20 to 40 grains, and as a stomachic and tonic, from 10 to 15 grains, three or four times a day" Moodeen Sheriff. "If a strong decoction of this drug be given three or four times a day and continued for three or four days in cases of dropsy, copious watery evacuations are discharged, and the dropsical effusion is relieved. In some cases the medicine must be continued for about a week to bring about the desired result" (Surg.-Maj. D. R. Thomson, M.D., C.I.E., Madras.) Watt's *Dictionary*.

Major F. J. Crawford, I.M.S. of Madras says:—

"This drug in the form of tincture was tried in several cases of ill-defined fever. In most it brought down the temperature, but as it produced some looseness of the bowels at the same time, its administration had to be stopped. Its use, however, might be advised in cases of low fever accompanied by constipation. In one case of symptomatic fever (elephantiasis) the temperature was appreciably lowered and the bowels regulated, they had previously been irregular. In another case a moderate attack of malarial fever which had resisted home (native) remedies, this drug, after being administered three times in 24 hours, brought the temperature down from 101°F. to 99.5 next morning, but the bowels became loose for a couple of days. This looseness was regulated by diminishing the frequency of the administration. In this case the fever did not return beyond an evening rise to 99°F. for a week. Subsequently it came to normal and remained there till discharge. (Rept. Indigenous Drugs Com. p: 36.)

In the Second Report of the Indigenous Drugs Committee, p. 29 it is stated that

"The drug has already been admitted into the *Indian and Colonial Addendum of the British Pharmacopæia*. It is produced in the Himalaya,

The following note on it was distributed ;—

Purpose.—To test the efficiency of the root of *Picrorhiza Kurroa* as to a tonic and febrifuge. For the purpose a tincture is provided, made according to the recipe of the *British Pharmacopæia*, *Indian and Colonial Addendum*, Government of India Edition, 1901, page 50.

Dose.— $\frac{1}{2}$ to 1 fluid drachm.

Note.—The drug as an antiperiodic seems to be very inferior to quinine, but as a bitter tonic, is, we believe, distinctly serviceable. It is extensively used in India under the name of *Kutki*, but it is far from being the only *Kutki* in the bazars, where several drugs bear this name, e.g., Black Hellebore and *Gentiana Kurroo*.

The root of *Picrorhiza Kurroa* is somewhat purgative. The active principle is picrorhizin.

The authors of the *Pharmacographia Indica* say :—" We can state from personal observation that it is used successfully as an antiperiodic in native (practice its slight laxative action is rather beneficial than otherwise." *Pharm. Indica*, Volume III, page 11)."

Chemical composition.—A proximate analysis of this drug showed the following percentage composition :—

Wax	...	...	...	1.06
Bitter principle (Picrorhizin)	...	...	...	14.06
Picrorhizetin	...	...	...	3.85
Organic acid ppt. by lead	...	...	...	3.54
Glucose	...	...	...	11.53
Cathartic acid, &c. (water extract)	...	...	...	9.33
Substances dissolved by NaHO	...	...	...	7.62
Arabin bodies from crude fibre	...	...	...	14.56
Fibre	...	...	...	24.00
Moisture	...	...	...	5.73
Ash	...	...	...	3.82

The bitter principle is a glucoside *Picrorhizin*, freely soluble in water and alcohol, but almost insoluble in pure ether. It is acid in reaction, is not precipitated from solution by lead salts or tannin, but is absorbed by animal charcoal together with any colouring matter that is present. It is best obtained by exhausting the powdered drug with crude ether, and is left, after the evaporation of the ether, in brown resinoid drops which form ramified crystals on standing. It is difficult to obtain the picrorhizin in a crystalline condition after heating or after solution in water. Any wax removed by the crude ether can be separated from the dry extract by petroleum spirit, which has no solvent action on the bitter principle. The picrorhizin is decomposed by hydrolizing it with a boiling 1 per cent. solution of hydrochloric acid for three hours, and a decomposition product, which we have named *Picrorhizetin* is formed together with glucose. In obtaining 0.7 gram of picrorhizetin 368 gram separated during the first hour, 219 gram in the second hour, 113 gram in the second hour, 113 gram in the third hour, and none in the fourth. Weighed quantities of the picrorhizin, after drying at 100°C., afforded, on hydrolysis, 62.48 and 62.79 per cent. of picrorhizetin, as the result of two

experiments. The glucose obtained from the decomposition was inactive towards polarized light. An infusion or tincture of the root boiled with diluted acid gradually loses its bitterness, and a large increase in the sugar is detected by Fehling's solution. Picrorhizetin is a red-brown, brittle, resinous, tasteless body soluble in aqueous alkalies. It is insoluble in water, and its solution in alcohol is precipitated by ether. By heating with strong sulphuric acid or when being burnt it evolves an odour of benzoin.

The wax after bleaching, and purifying by recrystallization from hot alcohol, had a melting point of 51°C. The organic acid separated by lead was red-coloured and gave a greenish colour with ferric salts. No tannic acid was present. Some picrorhizetin was naturally formed in the drug, and existed in a much smaller proportion in the freshly dried rhizome. After removing the bitter principle by continued percolation with alcohol, the marc was dried and exhausted with water, the dark red-brown solution was evaporated to dryness, and 2 gram of the residue was found to act as a decided purge. The aqueous extract treated with four volumes of alcohol afforded precipitates containing 14.5 and 15.3 per cent. of mineral matter, and with six volumes a precipitate was obtained with 10.8 per cent. of ash. We rely upon the physiological action of this extract in considering cathartic acid to be a constituent." *Pharmacographia Indica*, Vol. VII, pp. 12-13.

Dr. Lal Mohan Ghoshal concludes his thesis on *Picrorhiza Kurrooa*, in *Food and Drugs* for January, 1912 as follows:—

1. The drug *Picrorrhiza Kurrooa* has got a bitter principle named picrorrhizin a glucoside, mainly.
2. Its action is due to its bitter principle.
3. It has got no poisonous action.
4. It increases the gastric secretion and thereby acts as a stomachic and bitter tonic.
5. It diminishes the force of the heart beat and hence may be used in febrile cases, beneficial effect being due to the reduction of blood pressure.
6. It has a mild laxative action due to the presence of cathartic acid.

895. *Veronica Anagallis*, Linn. H.F.B.I., IV. 293.

Habitat:—N.-W. India, from the plains of the Punjab to Western Tibet, and from Kashmir to Bhutan. Bengal, the Khasia Mts. and Assam, the Deccan Peninsula, in the Concan only.

A perennial, glabrous, rarely pubescent erect, succulent herb. Stem hollow, creeping below, from 6-18 in. high and from the thickness of a sparrow's quill to that of the middle finger. Leaves 2-6 by $\frac{1}{3}$ - $\frac{2}{3}$ in., sessile (stem-clasping) or lowest petioled, oblong lanceolate or linear-oblong, entire or serrate, base, usually cordate. Flowers pale purple, pink or white, $\frac{1}{4}$ - $\frac{1}{2}$ in.

diam., in axillary racemes 3-6in. long. Bracts shorter than the flower stalks. Pedicels spreading, (usually longer than the Calyx). Sepals $\frac{1}{16}$ - $\frac{1}{4}$ in. long, subacute. Corolla $\frac{1}{8}$ - $\frac{1}{2}$ in. diam. Capsule notched, $\frac{1}{8}$ - $\frac{1}{2}$ in. diam., somewhat compressed laterally, turgid, orbicular, rarely broadly ovate in some Tibetan specimens (J. D. Hooker). Seeds ovoid or oblong, biconvex.

Use :—Used for the same purposes as *V. Beccabunga*.

896. *V. Beccabunga*, *Linn.* H.F.B.I., IV. 293.

Vern :—Tezak (Pb.).

Eng. :—Brooklime.

Habitat :—Western Himalaya, from Kashmir and Rawal Pindie to Kanawar

A glabrous or puberulous, decumbent, succulent herb, stem hollow, branches 6-18in., spreading. Leaves 1-2in., rarely obovate, sessile or shortly petioled, elliptic or oblong obtuse, crenate-serrate, base rounded. Racemes axillary, few or many-flowered, 2-4in.; pedicels spreading, bracts usually shorter than the pedicels. Sepals ovate-oblong, subacute. Corolla $\frac{1}{2}$ in. diam., blue or pink. Capsule and seed as in *Veronica Anagallis*, *Linn.*

Uses :—The plant is used medicinally in Kashmir (Honigberger.)

The leaves and young stems were once in favor as an antiscorbutic, and even now the young shoots are sometimes eaten as watercresses, the two plants being generally found growing together. They are perfectly wholesome, and might be more frequently employed but for prejudice. In oldentimes the leaves were applied to wounds, and are now sometimes bruised and put on burns. (Sowerby's English Bot. Vol. V., p. 170).

897. *Sopubia delphinifolia*, *G. Don.* H.F.B.I., IV. 302.

Syn. :—*Gerardia delphinifolia*, *Linn. Roxb.* 491.

Vern. :—Dudhali (Bomb.).

Habitat :—Banda, Behar, on Parasnath, Deccan Peninsula, from the Concan southwards.

A tall erect much-branched herb, 1-3 ft. high. Stem 4-sided, grooved, glabrous or scaberulous, often spotted with purple. Leaves pinnatisect, 1-1½ in. long. the uppermost (bracts) simple, segments filiform. Flowers subsessile, axillary, solitary or in few-flowered terminal racemes; bracteoles ½ in. long, filiform, pedicels slender. Calyx ¾ in. long, tube strongly ribbed; teeth linear-subulate, erect. Corolla rose-coloured, 1-1½ in. long, limb ¾ in. across; lobes broad, spreading. Filaments hairy. Capsule as long as the calyx, oblong-ellipsoid. (Duthie).

Use:—The juice of the plant is applied by field labourers in the Deccan to their feet to heal sores caused by exposure to moisture. It is astringent and stains the skin at first yellow and afterwards a black color (Dymock.).

898. *Pedicularis pectinata*, Wall. H.F.B.I., IV. 306.

Vern:—Mishran (Pb.).

Habitat:—Western Temperate Himalaya, from Kashmir to Kumaon.

Usually tall, stout, glabrous, except the often hairy spike, cauline leaves whorled, lanceolate, pinnatifid, or pinnatisect, with serrate segments or 2-pinnatifid, calyx-teeth acute entire, corolla-tube short, upper lip inflated, sickle-shaped, beak long, tip twisted. Stem 6-18 in., simple or branched. Leaves 3-6 in., sometimes 4 in. broad, ovate or oblong; petiole long, slender. Spikes 2-6 in., lax-fl'd.; bracts as long as the calyx, ovate or lanceolate. Calyx ½ in. long, inflated in fruit. Corolla ¾ in., rosered, beak with a double flexure, as long as the tube. Filaments hairy. Capsule ½ in., ovoid acute, tip exserted. Seeds large, ½ in. long, ridged and deeply pitted, pale.

Use:—In Kanawar the pounded leaves are given for hæmoptysis. The plant is also officinal at Lahore. (Stewart.)

899. *P. siphonantha*, Don. Prod. H.F.B.I., IV. 313.

Habitat:—Alpine Himalaya, from Kashmir to Sikkim.

Glabrate or sparsely pubescent or hirsute, stems many from

the root slender and leafy, rarely solitary with only radical leaves. Leaves petioled linear-oblong pinnatifid or pinnatisect, lobes many, short, crenulate, flowers axillary and in terminal racemes or heads, calyx-lobes crested, corolla pink, tube very slender 3-6 times as long as the calyx, upper lip a slender annular horn gradually narrowed from the base to the point, lower broadly 3-lobed.

Rootstock perennial? Stems 2-10 in. erect or ascending. Leaves 2-6 by $1\frac{1}{2}$ in., lobes or segments obtuse, cauline and radical alike. Racemes short or long; bracts leaf-like; pedicels of the lower flowers sometimes 1 in. Calyx $\frac{1}{3}$ - $\frac{1}{2}$ in., hirsute or glabrate, nerves distinct. Corolla rose-pink, tube very slender, sometimes 2 in.; upper lip longer than the broad lower. Capsule $\frac{1}{2}$ - $\frac{1}{3}$ in. long, broadly oblong, oblique, acute, half exserted or less. Seeds $\frac{1}{12}$ - $\frac{1}{10}$ in., oblong, obtuse, base, apiculate, striate.—Varies greatly in the size of the corolla and length of its tube. (J. D. Hooker).

Use.—Some part of this plant is used officinally in the Punjab (Stewart).

N. O. BIGNONIACEÆ.

900. *Oroxylum indicum*, Vent. H.F.B.I., IV. 378.

Syn..—*Bignonia indica*, Linn. Roxb. 495.

Sans..—Sheonak (a tree), Pruthusimlic (small kidneybean), Shuka-nâsâ (Acquiline nose), Kutanata (dishonest actor), Bhutavriksha (Goblin-tree), Katuaṅga (bitter-bodied), Tutuka (small), Salak (bark), Aralu (a kind of tree), Mayurajangha (peacock-thigh), Bhalluka (bear), Priya-jîva (dear life), Katambhara (filling hips).

Vern..—Ullu, arlús kharkath, pharkath sauna, assar sauna, shyona (Hind.); Sona, sanpatti, násoná (Beng.); Pomponia, phunphuna (Uriya); Arengi banu, arengebaung, somepatta (Kol.); Bana hatak (Santal.); Soizong (Rajbanshi); Kering (Assam); Cherpong (Mehi); Totilla, karamkanda (Nepal); Dhatte (Gond.); Mulín, miringa, sori, tâtpalang, tatmorang

(Pb.); Tattunúa (C. P.); Tantun, tetu, ulu, karkath, saunavanga, achi, vanga-maram (Tam.); Pamanía, pampána, dundillam, dondlup, Maṇḍukaparnamu, Sukanasamu, pampenachettu, (Tel.); Tetu, Anamungu, dundukara, bagi mokka, alaugi-mara. (Kan.); Palakapaiyana, aralu, veluttapatiri—maram, arantal (Mal). Ginsen, Dak-dawa, sicut (Palamow).

Habitat:—Common throughout India, from the Himalaya to Ceylon; not in the Western drier area, but in the Terai, west to the Chenab.

Usually a small deciduous tree, but attaining sometimes 30-40ft. Branched at the top. Bark $\frac{1}{4}$ in. thick, yellowish-grey, rather smooth, soft, with numerous large corky lenticels; yields rather a green juice when cut. Wood yellowish-white, soft, no heartwood (Gamble). Leaves extremely large, 3-5ft., triangular in outline, three-or quadri-pinnate with opposite pinnæ; rachis very stout, cylindric, much swollen at the branches, rough, with corky lenticels, primary pinnæ about 5 pair. Leaflets numerous, shortly petiolate, $2\frac{1}{2}$ -4 $\frac{1}{2}$ in., broadly oval or nearly rotundate at base, suddenly and shortly cordate, acuminate, obtuse, glabrous, paler beneath. Flowers with an unpleasant smell, numerous, dull-pale, pinkish-yellow inside, reddish-purple outside, on very stout, glabrous, spreading pedicels, $2\frac{1}{2}$ -3 in., long and articulated at base, arranged in very large erect racemes, 1-2ft. or more long, peduncle very short, branch-like, bracts fused with the peduncle. Calyx $1\frac{3}{4}$ in., oblong-campanulate, glabrous. Corolla-tube $2\frac{1}{4}$ in., mouth about 4 in., lobes much crumpled in bud, thickly covered on both sides with papillose hairs. Filaments cottony at base, disk fleshy, style $2\frac{1}{2}$ in., stigma $\frac{1}{2}$ in. wide with 2 semicircular plates. Ovary oblong, somewhat compressed, glabrous. Capsule 2-2 $\frac{1}{2}$ ft. or even more by $3\frac{1}{2}$ -4 in., wide, long, flat, swordlike, acute, tapering at both ends, dehiscenting at the edges; semi-woody, thin flat septum. Seeds very numerous, oval, wing extending all round except at base, $2\frac{1}{2}$ in. diam (Trimen). (C.B. Clarke).

Parts used:—The bark and seeds.

Uses:—In Hindu medicine, "root-bark considered astringent, tonic, and useful in diarrhoea and dysentery. Tender fruits are described as grateful, carminative and stomachic."

In otorrhœa, the use of an oil has been recommended in Sanskrit medicine, prepared by boiling a paste made of the root-bark with sesamun oil (Dutt).

The Gonds employ a decoction of the bark as a discutient application to rheumatic swellings. The powder and infusion of the bark are diaphoretic, and useful in acute rheumatism (*I. M. G.*, 1895, p. 66).

Powder made from the bark along with *hurdi*, is a useful cure for the sore-backs of horses (Gamble).

Seeds purgative (*J. J. Wood's Plants of Chutia Nagpur*, p. 125).

Chemical composition.—The bark has been examined by W. A. H. Naylor and E. M. Chaplin with the following results :—

A. One pound of the bark reduced to fine powder was percolated to exhaustion with cold petroleum ether. The ether was distilled off, and the residue, which weighed about 1·8 gram, possessed the characters of a soft greenish-brown fat, having an acid reaction and a slightly acrid taste. It was treated successively with ether and proof spirit, the former removed vegetable wax, which was subsequently identified as such after re-solution in limited quantities of ether and separation therefrom. The latter on evaporation gave a brownish-yellow residue small in quantity and crystalline. When further purified by extraction with ether and the ethereal residue by benzol it was golden yellow, unctuous to the touch, and pronouncedly acrid. Under the microscope it presented the appearance of long, wavy, branching crystals, which dissolved readily in alcohol, chloroform ether, petroleum ether, and benzol.

B. The marc was next percolated with cold ether. After distilling off the greater portion of the ether, and allowing the remainder to evaporate spontaneously, a yellow mass studded with minute interlacing crystals was obtained, which when airdried weighed about 4 grams. This product was treated with boiling proof spirit and filtered while hot; on cooling small yellow crystals fell out of solution. When quite cold the crop of crystals was collected and subjected to the action of boiling petroleum ether until freed from every trace of fat. It was then crystallized from boiling proof spirit until it had a constant melting point, and was no longer contaminated with uncrystallizable matter. The resulting crystals were dried under the receiver of an air-pump, and when constant weighed 0·9 gram. They were of a lemon yellow colour, about $\frac{1}{2}$ inch in length, and melted at $228^{\circ}5' - 229^{\circ}$ C. Alcohol, ether, glacial acetic acid, and hot benzol dissolved them readily, but they were practically insoluble in water hot or cold. The following reactions in connection with this interesting body have been noted, of which the most striking is its behaviour with the caustic alkalies. A minute quantity brought into contact with one drop of a weak solution of sodium potassium or ammonium

hydrates causes it to assume immediately a cherry-red colour, which quickly passes into brick-red and olive-green.

Owing to the insolubility of the crystals in water a proof spirit solution was used in applying the following tests :—

1. A solution of silver nitrate in proof spirit produced a bluish-black colour immediately, and after the liquid had stood for a few minutes black particles of reduced silver were precipitated.
2. A solution of neutral acetate of lead in proof spirit gave a light-red bulky precipitate insoluble in boiling acetic acid.
3. Lime water imparted an orange colour, which quickly changed to olive-green, followed by a precipitate of the same colour.
4. An aqueous solution of copper gave a golden yellow colour, quickly followed by a dirty brown precipitate, the supernatant liquid being distinctly greenish.
5. Solution of ferric chloride (acid) produced a brownish-red colour, which, in a few minutes, turned smoke-colour.
6. Solution of subacetate of lead gave a golden yellow precipitate.
7. An aqueous solution of mercuric chloride produced a white precipitate.
8. An aqueous solution of permanganate of potash, acidified with sulphuric acid, was instantly decolorized.
9. A solution of the crystals in proof spirit did not reduce Fehling.

The authors say :—" We have attempted to hydrolyse this body, by subjecting a strong alcoholic solution to the prolonged action of 10 per cent. solution of sulphuric acid at a boiling temperature, but without success.

" We have also inquired into its nature and centesimal composition, but the results so far obtained are not sufficiently conclusive to be incorporated in this paper. We hope to be able to publish shortly a supplementary note dealing with points in process of investigation. Mean while, we propose that this interesting principle be designated *Oroxylin*."

C. The marc left after exhaustion with petroleum spirit and ether was percolated with cold absolute alcohol. The residue resulting from the distillation of the spirit was treated with cold proof spirit, which took up the greater part of it. The insoluble portion dissolved readily in boiling proof spirit, and, on examination proved to be largely composed of the yellow crystalline body *oroxylin*. The cold proof spirit solution of the alcoholic residue was evaporated to dryness and the extract treated with water and filtered. The filtrate was treated successively with neutral and basic acetate of lead, and the precipitates after washing were suspended in water, decomposed by a current of sulphuretted hydrogen and the resultant plumbic sulphide removed by filtration. Sulphuretted hydrogen was also passed through the filtrate from the basic or plumbic acetate and the precipitated lead sulphide removed by filtration.

The three liquids thus obtained, which for convenience may be denominated i., ii., iii., were then evaporated down and the respective residues examined.

(i.) It was dissolved in the smallest quantity possible of cold water and diluted with many times its volume of alcohol. After setting aside for

twenty-four hours a precipitate fell, giving the general characters of parapectin. The supernatant liquid on evaporation left a scaly residue, astringent to the taste, and perfectly soluble in water. Its aqueous solution reduced Fehling and gave a copious bluish black precipitate with ferric chloride. Lime-water produced a bright golden-yellow colour, followed by a reddish-brown precipitate. From the tannins proper it differed in that it was not precipitated by solution of gelatine.

(ii.) This residue apparently consisted of pectin intermixed with small portions of No. iii.

(iii.) This was a dark uncrystallizable treacle-looking residue, which imparted to the palate a feeble sensation of sweetness. It was very soluble in water and reduced Fehling's solution abundantly. A strong aqueous solution was precipitated by absolute alcohol.

D. The marc from the alcoholic extraction was finally percolated to exhaustion with cold water. The liquor was evaporated down and the extract obtained taken up with hot water. A considerable amount of albuminous matter, which remained insoluble, was removed by filtration. The filtrate was treated successively with neutral and subacetate of lead and the precipitates decomposed in the same manner as described under C. The three liquids obtained, i., ii., iii., were evaporated down.

(i.) This residue was the smallest of the three. After standing for a considerable time some crystals were deposited, which on examination proved to be citric acid.

(ii.) Nothing of a crystalline nature was found in this residue. It appeared to consist chiefly of extractive matter.

(iii.) This residue after treatment with alcohol had the same characters and possessed the same properties as C. iii. It was not further examined.

The result of our examination of this bark may be summarized by stating the different principles which we have found—(1) crystalline fat; (2) wax; (3) acrid principle; (4) oroxylin; (5) chlorophyll; (6) pectinous substances; (7) Fehling-reducing principle; (8) astringent principle; (9) citric acid; (10) extractive matter.—*Pharm. Journ.* Sept. 27, 1890.

901. *Tecoma undulata*, G. Don. H.F.B.I., IV. 378.

Syn.:—*Bignonia undulata*, Smith. Roxb. 492.

Vern.:—*Rugtrora* (H.); *Rohira*, *roir*, *lahúra*, *luár* (Pb.); *Lohira*, *lohari*, *lahero*, *khen* (Sind); *Roir*, *lohuri*, *rakht-reora*, *rugtrora* (Bomb.); *Rakht-roda* (Mar.).

Habitat:—Western India; Sind; Punjab; Guzerat; Rajputana, extending eastwards to the Jumna.

An evergreen shrub or small tree. Bark $\frac{1}{4}$ in. thick, corky, reddish-brown. Wood greyish or yellowish-brown, close-grained,

mottled with lighter streaks (Gamble); youngest shoots and inflorescence often minutely pubescent, or grey-pubescent. Glabrate when old. Leaves simple, 6 by $1\frac{1}{2}$ in. (C.B. Clarke) obtuse, narrowly or linear-oblong, undulate, entire, grey, glabrous, but somewhat rough; Brandis says the blade is only 2-4 in. Petiole $\frac{3}{4}$ -1 in. long. Flowers inodorous large, from pale-yellow to deep-orange, in short 5-10-fid corymbs at the ends of branchlets, or on flattened lateral branches. Pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in. Calyx campanulate, $\frac{1}{2}$ in., hardly $\frac{1}{8}$ in. broad, teeth 5 obtuse. Corolla campanulate, limb oblique, 2 in. across, $1\frac{1}{2}$ in. long, orange. Stamens scarcely exsert, glabrous; anther-cells distinct, pendulous, narrowly oblong, sub-2-lobed. Capsule curved, 6-8 in. long, $\frac{1}{2}$ in. broad, glabrous, Valves tough, thin. Seeds including the wing 1 by $\frac{3}{8}$ in., wings very narrow round the apex of the seed, 0 at its base.

"A tree with drooping branches like the weeping willow; when in flower few trees can present a more noble or beautiful sight." (Gibson).

Uses:—The bark of the young branches is often employed in Sind as a remedy for syphilis (Murray).

902. *Dolichantrone Rheedii* Seem. H.F.B.I., IV. 379.

Vern.:—Vilpadri (Tam); Nir—pongellion (Mal).

Habitat:—Malabar.

A tree, attaining 50-60 ft. Leaves a foot long; leaflets 3-4 pairs with an old one, 2-3 in., rhomboid, often unequal at the base; petiolule $\frac{1}{4}$ in. Corymbs few- (sometimes 1-) fld., short-peduncled; pedicels $\frac{1}{4}$ -1 in., stout. Calyx $1\frac{1}{2}$ in. Corolla 4-7 in., white; tube campanulate near the mouth; segments 1 in., crenate toothed. Anther cells large, elliptic, separate, divaricate. Capsule 18 by $\frac{3}{4}$ 1 in., nearly straight, not ribbed. Seeds (including the wings) $\frac{3}{4}$ by $\frac{1}{2}$ in., rectangular.

Uses:—The seeds with ginger and Pavetta root are administered in spasmodic affections. (Rheede).

The bruised leaves have an aromatic but disagreeable odor (Trimen).

903. *D. falcata*, Seem. H.F.B.I., IV. 380; Roxb. 492.

Vern.:—Hāwar (Oudh); Mendal, manehingi (Banswara);

Kanséri (Meywar); Mersingh, bhil (C. P.); Mersinge, kanseri, mendal manchingi (Bom.); Mersingi (Mar.); Karanjelo (Kurku); Gudmurki (Kan); Kadatathie (Tam.); Udda, wodi (Tel.) Nir pongilam (Malay.)

Habitat:—Bundelkhand; dry hills in C. India. Deccan Peninsula; Mysore and Vellyengry Hills; Belgaum.

A middle-sized, deciduous tree, 20-50ft., more or less grey, pubescent, or shortly villous. Bark $\frac{1}{8}$ in. or less thick, bluish-grey, exfoliating in irregular woody scales. Wood whitish, hard, close-even-grained, shining, glossy; no heart-wood. Leaves imparipinnate, 3-6in. Leaflets 5-7 by $\frac{1}{2}$ -1 $\frac{1}{2}$ in., pubescent or glabrous, obovate or round-elliptic, rarely with a small obtuse point. Petiole $\frac{1}{2}$ in. long. Petiolule 0, rarely $\frac{1}{8}$ - $\frac{1}{2}$ in. Flowers white, in fewfid corymbs, mostly 1-3-fid, subsessile. Pedicels $\frac{1}{8}$ in. Calyx $\frac{1}{2}$ - $\frac{3}{4}$ in. of the expanded flowers, softly grey, pubescent. Corolla-tube slender below, 1-1 $\frac{1}{2}$ in. long. Anthers included. Capsule flat, much curved, 10-18 by $\frac{3}{4}$ in. compressed, glabrous. Seeds about 1in. long by $\frac{1}{4}$ in. wide, rectangular, winged at both ends.

Use:—A decoction of the fruit is used medicinally (Watt).

It has the reputation of being used to procure abortion, and the bark is, it is stated, used as a fish poison.

Dr. Lyon, Chemical Analyser to the Government of Bombay, found, however, no ill effects to follow the administration of a considerable quantity of a decoction of the bark to a small dog. (Med. Juris. for India, p. 216.) It is possible that the woody capsules, which are about a foot in length by $\frac{2}{3}$ of an inch in diameter, and somewhat curved, may be used as abortion sticks. (Pharmacographia Indica, III. 24).

904. *Heterophragma Roxburghii*, H.F.B.I., IV. 381.

Syn.:—*Bignonia quadrilocularis*, Roxb. 494.

Vern.:—Pullung, warras (Bomb.); Baro-kala-goru (Tam.); Bond-gu (Tel.); Adwinuggi (Kan).

Habitat—W. Deccan Peninsula, from Bombay southwards; Central India; and the Godavery Forests.

A large tree; innovations woolly. Bark $\frac{1}{2}$ in. thick, grey or dark-brown, exfoliating in small angular scales. Wood grey,

rough, moderately hard ; no heartwood, no annual rings. Leaves 1-pinnate, tomentose when young, glabrous afterwards, generally approximate near the ends of branches, 1-2ft. Leaflets 7-9, $4\frac{1}{2}$ by 2in., obtuse, with a short point, elliptic, entire or crenate, often serrulate, 3-4 pair ; petiolule $0\frac{1}{8}$ in. Flowers in large, terminal, densely tawny-tomentose panicles. Pedicels short, woolly. Calyx on one side more deeply or obtusely bilabiate or irregularly lobed half-way down. Corolla floccose, ultimately glabrate, campanulate, white, fringed with pink, tube $1\frac{1}{2}$ in., mouth 2in. diam., lobes crisped. Anther-cells elliptic ; divaricate at base. Capsule straight, narrowly oblong, slightly compressed, smooth, velvety while young, 8-12 by $1\frac{1}{2}$ -2in., divided into 4 cells by the 4-ridged septum, which latter, when cut horizontally, looks cross-shaped. Seeds $1\frac{1}{2}$ by 1in.

Use :--The natives extract from the wood a thick fluid like tar, which they use in skin diseases.

905. *Stereospermum chelonoides*, DeC., H.F.B.I., IV. 382.

Syn :--*Bignonia chelonoides*, Linn. f. Roxb. 493.

Vern :--Pader, padri, parral (Hind.) ; Pandair (Lohardaga) ; Pandri (Kharwar) ; Dharmar, atkapali (Beng.) ; Kandior, pondair (Kol.) ; Parolli (Assam) ; Pareya-auwal (Cachar) ; Bolzel (Garó) ; Parari (Nepal) ; Syngyen (Lepcha) ; Sirpang (Michi) ; Pamphunia (Uriya) ; Tsaintsa (Magh) ; Taitu (Berar) ; Padurni (Bhil) ; Pádál, padri, paral, kirsél, tuatuka (Bomb.) ; Kirsél, tuatuka, pádul, padvale, pádhri (Mar.) ; Pádri, pon-padira, pathiri, vela-padri, appu, Kâna Virukham (Tam.) ; Tagada, thágu, kala gorú, moka-yapa, pisúl (Tl.) ; Kalihútrú, kall-udi, bondh-vála, bile padri, maradakarji, puruli mara (Kan.) ; Nai-udi, mallali (Coorg) ; Pátirimaram (Mal).

Habitat :--Through moister India ; from the Terai of Oudh and Assam to Ceylon.

A large deciduous tree, 30-60ft., nearly glabrous, except the flowers. Bark brown varying in thickness up to $\frac{1}{2}$ in., outer bark corky. Wood hard, grey, no heartwood. Leaves 1-pinnate, 12-18in., leaflets imparipinnate, 3-5 pair, elliptic caudate acuminate, blade 4-6in., petiole $\frac{1}{2}$ - $\frac{1}{2}$ in. long. Panicle branches slender,

glabrous. Flowers fragrant. Calyx $\frac{1}{4}$ in., shortly 3-toothed. Corolla yellow, tinged and marked purple red, $\frac{3}{4}$ in. long, thinly hairy within and without; crisped. Capsule linear, obscurely-quadrangular, slender curved, 10-30 by $\frac{1}{2}$ in., smooth or speckled. Valves coriaceous, midrib raised. Seeds wedge-shaped or subtrigonal, embedded in notches in the septums. 1 by $\frac{1}{2}$ in., easily splitting through the centre.

Uses:—The roots, leaves and flowers are used in decoction as febrifuge (T. N. Mukerji).

The juice of the leaves, mixed with lime juice, is of use in maniacal cases (Rheede).

906. *S. suaveolens*, DeC., H.F.B.I., IV. 382.

Syn:—*Bignonia suaveolens*, Roxb. 493.

Sans:—According to Sanskrit authors there are two varieties :

Pāṭalā (pale-red), Kāma-duti (love-messenger), Kumbhika (a small pitcher), Kāla-vrittika (black stalk), Sulpha-medhā (little understanding), Madhor-duti (messenger of a demon), Tāmra-pushpa (copper flower), Ambu-vāsini (water-dweller.)

The second variety—Sveta-kumbhika (the white pitcher), Krishna-pāṭala.

Vern.:—Pāral, padal, padiāla, pād, padaria, parur, purula, pār (Hind.); Parlú, pārl, ghunta, mág (Beng.); Pandri (Kharwar); Kandior (Kol.); Papré, Pader (Santal); Parair (Nepal); Singyen (Lepcha); Patúli (Uriya); padar (Kurku); Pandri (C. P.); Phalgataítu (Melghat); Unt-katar, padar (Gond.); Pádál (N.-W. P.); Pádál, kaltháun, summe (Pb.); Pan, dan (Bhil); Paral, paddal, pahad (Bomb.); Pádál, padialú, parúl, kalagori (Mar.); Padiri, goddatipalusu (Nellore); Padri (Tam.); Kalagoru, kuberakashi, padari, patali (Tel.); Húday, billa, vulunantri marada, kayi (Kan.).

Habitat:—Throughout moister India, from the Himalayan Terai to Travancore and Tenasserim. "Planted specially about the Buddhist Temples" in Ceylon, says Trimen.

A large, deciduous tree, 30-60ft. Bark $\frac{1}{4}$ in. thick, grey, exfoliating in very irregularly-shaped flat scales. Wood hard. Sapwood grey; heartwood small, yellowish brown, beautifully

mottled with dark streaks, very hard, seasons and polishes well (Gamble). Young shoots covered with viscid pubescence. Leaves imparipinnate. Leaflets 3-5 pair, elliptic, shortly acuminate, often serrulate, blade 3-6in. long, rough on the upper, pubescent on the under side; petiole short. Flowers exquisitely fragrant, in lax trichotomous viscid panicles, dull crimson (Brandis), dull purple (Trimen), which latter is more like the colour of the flowers seen by me in Ratnagiri and Thana (K. R. K.). Corolla 1-1½in. long, pubescent funnel-shaped, limb oblique, the 3 inferior lobes longer and the edges of all much curled. Capsule straight, cylindric, 12-24 by ¾in., dark-grey or purple; slightly ribbed, rough, with elevated specks; valves thick, hard, woody. Seeds 1¼ by ¼in., deeply notched at the middle, subtrigonus, embedded in the notches of the septum. (Brandis. C. B. Clarke).

Uses:—"The flowers rubbed up with honey are given to check hiccup. The root bark is an ingredient in *dasamāla*. It is regarded as cooling, diuretic and tonic, and is generally used in combination with other medicines. The ashes of the plant are used in the preparation of alkaline water and caustic pastes" (U. C. Dutt.)

In Tanjore the flowers are taken in the form of a confection as an aphrodisiac. (P. S. Mootooswamy).

907. *S. Xylocarpum*, Wight. H.F.B.I., IV. 383.

Syn.:—*Bignonia xylocarpa*, Roxb. 494.

Vern.:—Ghan-seng (Can.); Khar-sing (Mar.); Vaden kurni maram (Tam.)

Habitat:—Common in the Deccan Peninsula, extending North to the Satpura Range.

A deciduous tree, middle-sized, 30-60ft.; innovations pubescent. Bark ¼in. thick, lightly grey. Sapwood large, grey, heartwood very hard, orange-brown. Annual rings well marked by an irregular belt of numerous pores (Gamble). Leaves 2-pinnate or 3-pinnate, 1-4ft. long. Leaflets 3 by 1½in., subsessile, elliptic, acute, entire, mature glabrous, "hard and slightly rough when full grown," says Brandis. Flowers fragrant, white with a tinge of yellow, in dense, compound, pubescent, erect, somewhat rigid

panicles. Calyx $\frac{1}{2}$ - $\frac{3}{4}$ in., pubescent or mature glabrate; lobes 3-5, very short, broad. Corolla $1\frac{1}{2}$ -2 in., campanulate or ventricose from near base, sub-glabrous; lobes round, crispid. Filaments hairy below. Capsule long, hard, woody, rugged or tuberculous, 12-30 by $1-1\frac{1}{2}$ in., a little curved says Brandis. Valves $1-1\frac{1}{2}$ in. broad, woody; edissepiment, cylindric, shining. Seeds, including the wings $1\frac{1}{4}$ - $\frac{1}{2}$ in., thinly discoid, in 4 rows.

Uses.:—The oil from the wood is useful in cutaneous affections. Dr. Gibson is of opinion that it is well worthy of attention as an external application in these cases (Ph. Ind.). From some trials which I have made with it, I conclude that its properties are similar to those of Pine tar (Dymock).

908. *Amphicome Emodi*, Lindl. H.F.B.I., IV. 385.

Vern. :—Kaur. (Kashmir).

Habitat. :—W. Himalaya, from Kashmir to Nepal.

A perennial, erect, glabrous herb. Stem 12-24 in. Rootstock woody. Leaves alternate 1-pinnate, 5-8 in. Leaflets 5-9, $1-1\frac{1}{2}$ in. ovate, end one usually longest, sometimes lobed, scarcely acute. Flowers pink. Racemes not rarely 2-3 sub-panicled. Calyx, says Collett, entire or obscurely toothed; "truncate or with triangular scarcely acuminate teeth." (C. B. Clarke). Corolla $1\frac{1}{2}$ -2 $\frac{1}{2}$ in. long, $\frac{1}{2}$ - $1\frac{1}{4}$ wide at the mouth; tube tinged with yellow. Capsule linear, slender, terete, smooth. Seeds winged.

This, a discovery of Dr. Wallich, is the original or first species of *Amphicome*; a genus of Northern India, consisting of two species. It is indeed a remarkably handsome plant, native of the mountains of Emodi, near Srinaghur and on the Suen range of hills. [*Bot. Mag.* December 1st, 1855.]

Parts used :—The root and stem.

Uses.—In Kashmir, the drug is prescribed for fever, and is considered a substitute for chirata.

It contains an alkaloid, an acid fat, a wax, yellow colouring matter and sugar. The alkaloid is intensely bitter and is probably the active medicinal agent in the plant (Annual Report of the Indian Museum, Industrial Section, for the year 1907-8, p. 21; Ph. J. Vol. 79, p. 506).

N. O. PEDALINEÆ.

909. *Martynia diandra*, *Glox.* H.F.B.I., IV. 386.

Vern.:—Bichchhu (H), Naka-tali (Tam).

English.:—Tiger claw or Devil's claw.

Habitat.:—An American weed, it is now common in the Gangetic plain and elsewhere in India on road sides and in waste places, flowering during the rainy season.

A tall coarse herb. Leaves large, opposite, cordate, glutinous. Flowers diandrous, rose-colored and handsome like those of *Sesamum indicum*, *DeC.* Fruit large, woody, beaked by two curved spines, having somewhat the appearance of a beetle.

Uses.:—The fruit is rubbed down with water and applied to the part stung by scorpion.

910. *PedaliuM Murex*, *Linn.*, H.F.B.I., IV. 386, Roxb. 496.

Vern.:—Farid-búti, bará gókhru (Hind.); Khasake-kabir (Arab.); Khasake-kalán (Pers.); Barâ-ghokru (Dec.); Perunerunji (Tam.); Enuga-palleru-mullu. pedda-palleru (Tel.); Bara-ghokru (Beng.); Motto-ghokru (Guz.); Hatti-charátte, mothe gokharu (Mar.); Anne-galu-gida (Kan.).

Habitat.:—Dekkan and Konkan. Found by me in Thana district at Chinchni (Tarapur) and at Ghat Kopar hill spur (K. R. K.)

An annual herb, growing in sandy places near the sea. Stems decumbent, much branched, thick, slightly rough with scaly glands or hairs. Leaves opposite, 1-1½ in., broadly oval-oblong, acute at base, truncate or obtuse, very coarsely crenate-serrate or lobed, glabrous above, covered with minute scaly glands beneath, rather fleshy, pale glaucous green. Petiole ¼-½ in. Flowers sulphur yellow, on very short curved peduncles, Calyx-tube very short and wide; segments linear, spreading. Corolla limb 1 in. diam.; lobes broad; throat hairy within; filaments glandular—hairy at base. Fruit ½-¾ in., narrowed below

into a short thick stalk, broadly ovoid, bluntly 4-angled with the spines from the angles, pericarp very tough, fibrous woody.

Uses :—The fresh leaves and stems, briskly agitated in cold water, speedily convert it into a *thick mucilage*, nearly of the consistence of the white of a raw egg, inodorous and tasteless. An infusion, thus prepared, is a highly prized remedy amongst the people of Southern India, in *gonorrhœa* and *dysuria*. Facts communicated to the Editor, leave little doubt that in these cases it is a remedy of considerable value, and that as a diuretic its action is speedy and marked. Dr. Ives (*Voyage to India*, p. 466) speaks very favourably of the virtues of this plant, under the name of *Ghanti-gura* or *Goerow* (*Gokeroo*, Hind.); and he adds to his own testimony that of Dr. Thomas, as to the power of the mucilage to cure *gonorrhœa* without the aid of any other medicine. Water thus rendered mucilaginous, soon returns to its original fluidity, and it therefore requires to be freshly prepared each time before its exhibition. Its virtues are well deserving of further investigation. To the fruits, demulcent and diuretic properties are assigned, and they are extensively employed as such by the natives (Ph. Ind.).

The fruits are possessed of antispasmodic and aphrodisiac properties. The decoction of the fruit is useful in irritation of the urinary organs. The juice is a good gargle and the plant makes a good poultice (Dymock.) The juice is used in aphthæ as a local application (Dr. Emerson). Of late years it has been introduced into European medicine as a remedy for spermatorrhœa, incontinence of urine, and impotence (*Practitioner*, XVII. 381). "The juice of the fruit is an emmenagogue; it is employed in puerperal diseases; and to promote the lochial discharge. Leaves are used as a curry in splenic enlargements. Decoction of the root is antibilious" (Dr. Thompson, in Watt's *Dictionary*.)

Chemical composition.—The fruits contain a greenish-coloured fat, a small quantity of resin, and an alkaloid in the alcoholic extract. The mucilage separated by water is precipitated by acetate of lead solution and alcohol, and in these respects resembles the mucilage of gum arabic. The ash of the airdried fruit amounts to 5.43 per cent. (*Pharmacographia Indica*, III. 36).

911. *Sesamum indicum*, DeC. H.F.B.I., IV. 387.

Syn. :—*S. orientale*, Linn. Roxb. 491.

Sans. :—Tila.

Vern. :—Mithá til, krishna-til (Hind.) ; Tíl (Beng.) ; Sinsim (Arab.) ; Kunjad (Pers.) ; Wal lenney, yelloocheddi, (Tam.) ; Manchinúne nuvulu (Tel.) ; Bárik til (Dec.) ; Kasi, Khasa (Uriya.)

Eng. :—Gingelly ; Sesame.

Habitat. :—Cultivated throughout the warmer parts of India.

Erect annual herbs, 1-2ft. high, pubescent or puberulous. Leaves 3-5in., variable on the same plant, upper often narrowly oblong, sub-entire, middle ovate, ovate-toothed, lower lobed or pedatisect. Petiole $\frac{1}{2}$ -2in. Pedicels $\frac{1}{2}$ in., solitary, rarely 2-3-nate. Flowers with a strong, unpleasant odour. Sepals $\frac{1}{2}$ in., lanceolate. Corolla 1 $\frac{1}{2}$ in., pubescent, whitish or with red, purplish or yellow marks. Capsule tetragonous, oblong, 1 by $\frac{1}{2}$ in., erect, scabrid pilose, the same width, from top to bottom, usually shortly acuminate ; 2-valved half-way down, or sometimes to the base or ultimately 4-valved. Seeds brown, smooth. There is a black-seeded variety.

Uses. :—In Hindu medical works, three varieties of *til* seeds have been described,—black, white and red. The black kind is the best suited for medicinal use. "Sesamum seeds are considered emollient, nourishing, tonic, diuretic and lactagogue. They are said to be especially serviceable in piles, by regulating the bowels and removing constipation. Sesamum seeds ground to a paste with water are given with butter in bleeding piles. Sweetmeats made of the seeds are also beneficial in this disease. A poultice made of the seeds is applied to ulcers. Both the seeds and the oil are used as demulcents in dysentery and urinary diseases in combination with other medicines of their class" (*Hindu Mat. Med.*) "In decoction the seed is said to be emmenagogue ; the same preparation, sweetened with sugar, is prescribed in cough ; a compound decoction with linseed is used as an aphrodisiac ; a plaster made of the ground seeds is applied to burns, scalds, &c.; a lotion made from the leaves is used as a hair-wash, and is supposed to promote the growth of

the hair and make it black; a decoction of the root is used to have the same properties; a powder made from the roasted and decorticated seeds is called *Rahisee* in Arabic and *Arwah-i-kunjad* in Persian; it is used as an emollient both externally and internally (Dymock).

The Editor for many years employed the oil as a *substitute for olive oil*, in the preparation of *Linimentum Calcis*, and found it *answer well*. The poorer natives use it much for *dietetical* purposes. The seeds have powerfully *emmenagogue* properties assigned to them, and it is believed by the natives and Indo-Britons that, if taken largely, they are capable of *producing abortion*. In *amenorrhœa*, the employment of a warm *sitz bath* containing a *handful of the seeds*, bruised, has been reported to the Editor, on good authority, to be an efficient mode of treatment. The alleged *emmenagogue* properties of these seeds deserve further investigation. The leaves (*Sesami folia* or *Benne leaves*) are officinal in the secondary list of the U. S. Pharmacopœia; they abound with thick viscid mucilage, which is readily imparted to water, and an infusion of them is much used in the Southern States of North America in all affections requiring demulcents. One or two full-sized fresh leaves, infused or agitated in half a pint of cold water, will soon render it sufficiently viscid for this purpose. If the dried leaves be used, hot water should be substituted for the cold. The leaves also serve for the preparation of emollient poultices (*U. S. Disp.*, p. 714). How far the leaves of the Indian grown plant may be used in this way remains to be determined (*Ph. Ind.*).

"I have employed," Dr. Evers says, "the mucilage, obtained from the leaves of the Indian plant, in the treatment of sixteen cases of dysentery, and in all recovery followed. From six to seven days was the time necessary for such treatment. I confess, however, that my cases were not of the virulent type seen towards the end of the rainy season. The drug acts simply as a demulcent, and does not, in my opinion, exert any specific influence on the disease; furthermore, it is necessary to combine an opiate with it, to relieve the tenesmus, so that probably the opium added has as much to do in checking the disease as the

mucilage itself." With regard to the value of the seeds as an emmenagogue, Dr. Evers says: "In three cases of congestive dysmenorrhœa I administered the powder of the seeds in 10-grain doses, three or four times a day, with benefit. I have at the same time employed the hip-bath recommended by Waring. It is commonly believed in the south of India that the seeds, when eaten by pregnant women, are likely to induce abortion; but no instance of the kind has ever come under my notice, nor have I heard of any."

"I have for a long time used the following in gonorrhœa, and prefer it to copaiba or liquor potassæ, R. Ol. Sesami *m xx*; Aquæ Calcis *m xx*; Aquæ 3j. in mixture." (Hon. Surg. Morris in Watt's *Dictionary*.)

Regarding the amount of oil in the seed, Leather found that the variation is from 48 to 52 per cent. though some specimens contained as much as 56 per cent. and some as little as 45 per cent. These differences appear to be independent of variety, province or climate. From 42 to 48 per cent. of oil may be obtained by expression. The seeds also contain about 3 per cent. of nitrogen and the cake is an excellent cattle-food. If made from unsound seed the cake may be used as a manure.

Sesame oil has been frequently examined by chemists, and the following average constants are quoted: Specific gravity at 15°, 0.923 to 0.926; solidifying point, -5°; saponification value, 187.6 to 194.6; iodine value, 103 to 115; Reichert-Meißl value, 1.2; Maumené test, 63° to 5°; butyro-refractometer at 25°, 68.0; insoluble fatty acids and unsaponifiable, 95.7; melting point, 25° to 30°; neutralisation value, 196 to 261; mean molecular weight, 286.

Sesame oil contains, according to Farnsteiner, 12.1 to 14.1 per cent. of solid acids, and according to Lane 78.1 per cent. of liquid fatty acids. These consist of oleic and linolic acids. Sesame oil is dextro-rotatory, a property which may be used as an additional means of identifying the oil. The Indian oil has a lower rotation than African. The amount of unsaponifiable matter in sesame oil varies from 0.95 to 1.32 per cent. and contains phytosterol, sesamin and a so-called red oil. The phytosterol recrystallised from alcohol melts at 139°-139.2°. In 1891 Tocher extracted from the oil, by means of glacial acetic acid, a crystalline substance named sesamin. This melts at 118° and assumes a green and then bright red colour with nitro-sulphuric acid. An extremely characteristic colour reaction, called Baudouin's test, is now used to detect the presence of sesame oil in mixtures with other oils. The test is applied as follows: Dissolve 0.1 gm. of sugar in 10 c.c. of hydrochloric acid of specific gravity 1.19 in a test tube, add 20 c.c. of the oil to be tested, shake thoroughly for one minute and allow to stand. The aqueous solution separates readily, and in the presence of even the smallest quantity of sesame oil, it will be found coloured crimson.-(Agric. Ledger, 1911-12, No. 5).

N. O. ACANTHACEÆ.

912. *Cardanthera uliginosa*, Ham. H.F.B.I., IV. 403.

Syn.:—*Ruellia uliginosa*, Linn. f. Roxb. 475; *Adenosma ulginosa*, Nees.

Habitat:—In dry-up rice-swamps; S. Madras, frequent. Sikkim Terai.

An annual herb, 1-2½ ft., erect or decumbent, branching from the base. Stem pubescent upwards. Leaves 1 by ½ in., glabrous, sub-pubescent, subsessile, oblong or subovate, entire or crenate. Spikes 1-3 in., scarcely interrupted at the base even in fruit. Flowers mostly in opposite axils. Bracts ½ in., from elliptic to cordate, glabrous or puberulous, 4-ranked, imbricated in fruit, bracteoles ½ in., ovate or elliptic. Sepals ½ in., linear, pubescent. Corolla ½ in., puberulous. Stamens 4, fertile. Anthers of the posterior stamens half as large as of the anterior. Capsule ½ in., minutely pilose upwards.

Use:—The juice of its leaves mixed with salt, is used on the Malabar Coast as a blood purifier. (Balfour.)

913. *Hygrophila spinosa*, J. Anders. H.F.B.I., IV. 408.

Syn.:—*Ruellia longifolia*, Roxb. 475; *Asteracantha longifolia*, Nees.

Sans.:—Ikshugandha; Kokilāksha.

Vern.:—Tāl-makhānā, gokshura (H.); Kuliakhara, kante-kalikā (B.); Niramalli (Tam.); Nirguri veru (Tel.); Tālīmakhāna, Kolasunda (Mar.); Ekharo, gôkhru (Guz.); Kalavan kabija (Kan.).

Habitat:—Abundant throughout India in ditches; from the Himalaya to Ceylon. Very common in the Konkan.

An annual marshy herb, with an ascending rhizome. Stems numerous, stout, erect, hispid, 2-5 ft., usually fascicled and undivided or unbranched, somewhat compressed, thickened at nodes with long hair below each node. Leaves sessile, 6 at a node, 2 outer 4-5 in., 4 inner about 1½ in. each having a nearly straight

sharp yellow spine about lin. long in the axil, tapering at both ends, sparsely hispid on both sides, spinous ciliate (Trimen). Flowers, bright purple-blue, occasionally white; 8 (in 4 pair), at each node. Bracts like the leaves, but smaller; bractlets linear, hyaline below, bristly hairy on back. Sepals 4, shorter than bractlets, equal, narrow, but one much broader than the rest; hyaline with long hair outside. Corolla glabrous, lobes oblong, truncate. Anther oblong, subequal. Capsule $\frac{1}{2}$ lin., shorter than the sepals, linear-oblong, 4-8-seeded.

Uses:—In Hindu medicine, the leaves are described as cooling and useful in jaundice and anasarca. The root is also considered cooling, bitter and tonic, and is used in rheumatism, urinary affections and anasarca. The ashes also used as diuretic in dropsy (Dutt). The Mahomedan physicians consider the seeds as aphrodisiac (Dymock.)

Dr. Kirkpatrick (*Cat. of Mysore Drugs*, No. 451) states that he frequently employed it in dropsical cases, and that it undoubtedly possesses considerable power as a diuretic. Dr. Gibson also bears testimony to its powers as a diuretic; and it is favourably reported on by Dr. Æ. Ross and Native Surgeon Iyaswamy (*Ph. Ind.*).

The seeds are given for gonorrhœa, and with milk and sugar in spermatorrhœa.

When placed in the mouth they immediately become coated with a large quantity of extremely tenacious mucilage, which adheres to the tongue and palate and is of rather agreeable flavour. The seeds are one of *Panchavija*, or "five seeds," the others being those of *Celastrus*, Fenugreek, Ajwan, and Cumin. There are, however, several other sets of five seeds.

The seeds are glutinous, besides being mucilaginous. They contain 4.92 per cent. of nitrogen, which is equivalent to 31.14 per cent. of albuminoids, traces of an alkaloid, and 23 per cent. of a yellow fixed oil. The mucilage is not affected by ferric chloride, plumbic acetate, or by two volumes of alcohol. (*Pharmacogr. Ind.*, III 39-40.)

914. *Ruellia prostrata*; Lamk. H.F.B.I., IV. 411; Roxb. 473.

Vern.:—Upu-dali (Mal.).

Habitat:—Deccan Peninsula, extending north to Behar.

A small diffuse undershrub. Stems 6-18 in. long, prostrate, or climbing, amongst bushes, much branched, internodes long, the nodes more or less hairy and often tinged with purple. Leaves $\frac{3}{4}$ -3 in. long, ovate or elliptic, acute at both ends, entire, glabrous or slightly hairy, petioles, $\frac{1}{4}$ - $\frac{3}{4}$ in. long. Flowers subsessile, solitary or few together; bracteoles similar to the leaves but smaller. Calyx $\frac{1}{2}$ in. long, divided to below the middle; segments linear-subulate, acute, hairy. Corolla pale greyish-purple, $1\frac{1}{4}$ in. long, caducous, pubescent outside; tube narrowly cylindric below, funnel-shaped above; lobes subequal, obovate-oblong, rounded. Capsule $\frac{3}{4}$ in. long, clavate, pointed, pubescent. Seeds 16-20, subglabrous but with a dense fringe of hygroscopic hairs on the margin. (Duthie).

Uses:—The juice of the leaves, boiled with a little salt, is supposed on the Malabar Coast to correct a depraved state of the humors (Rheede). They are sometimes given with *pundum* or liquid copal as a remedy for gonorrhœa (Ainslie.)

915. *R. suffruticosa*, Roxb. H.F.B.I., IV. 413
Roxb. 476.

Vern.:—Chanlia (Santal.).

Habitat:—Dinajpur; (Bengal); throughout Chota Nagpore. Upper Gangetic Plain, and Moradabad.

An erect pubescent undershrub, 1-2 ft. high. Roots stout, often with fusiform swellings. Stems herbaceous, annually produced from a short creeping woody rhizome. Leaves petioled lanceolate elliptic or oblanceolate, the lower ones usually smaller and often suborbicular, obtuse or subacute, entire, villous with white hairs on both surfaces especially on the nerves and veins beneath, margins ciliate. Flowers solitary, terminal, subsessile; bracteoles resembling the leaves but smaller and narrower, $\frac{3}{4}$ in. long, stalked. Roxburgh states that the flowers open at sunset and drop off on the following morning. Calyx-segments $\frac{1}{4}$ in. long, linear, puberulous or nearly glabrous. Corolla white, $1\frac{1}{2}$ -2 in. long, tube slender, limb subregular. Capsule $1\frac{1}{2}$ in. long, oblong, glabrous, often tinged with purple. Seeds few. (Duthie).

Use :—The root is used medicinally by the Santals in gonorrhœa, syphilis and renal affections generally (Campbell).

It is also used by them Santals for producing fermentation in the grain from which they manufacture their beer.

916. *Dædalacanthus roseus*. T. Anders. H.F.B.I., IV. 419.

Vern. :—Dasamúli (Mar.)

Habitat :—W. and S. Deccan Peninsula, from the Bombay Ghats to Mangalore.

A perennial, glabrous herb. Stems 2-6ft. Leaves 5 by 2in., elliptic, acuminate at both ends, glabrous, lineolate. Spikes linear, subinterrupted, often 6in. Peduncles 0-2in., axillary and terminal. Bracts all but the lowest imbricated, $\frac{1}{2}$ - $\frac{3}{4}$ in., shortly rugose by raised inarching green nerves; margins entire, glabrous, ciliate or very hairy. Corolla 1-1 $\frac{1}{2}$ in. rose subglabrous. Seeds $\frac{1}{8}$ in. diam., much compressed. Roots usually ten in number, tuberous, spindle-shaped, as thick as a quill, several inches in length and covered by a dark brown bark.

Uses :—The root boiled in milk is a popular remedy for leucorrhœa; dose one drachm. In the Southern Concan, it is given to pregnant cattle to promote the growth of the fœtus (Dymock).

917. *Strobilanthes callosus*, Nees. H.F.B.I., IV. 451.

Vern. :—Kárvi (Bomb.).

Habitat :—S. Deccan Peninsula; common in the Ghats; Central India.

A shrub, 6 ft.; branches glabrate, often warted or scabrous-tubercled. Leaves 7 by 3 in., sometimes much larger, crenate, conspicuously lineolate above; nerves 8-16 pair; petiole 2 in. Spikes 1-4 in., often densely or laxly cymose; bracts $\frac{1}{2}$ -1 in., orbicular or elliptic. Calyx $\frac{1}{2}$ in., in fruit often exceeding $\frac{3}{4}$ in., lobed nearly to the base, segments oblong, obtuse, softly hairy. Corolla 1 $\frac{1}{2}$ in., subsymmetric glabrous without, very hairy within, deep-blue (Dalzell): cylindric base as long as the ventricose

portion. Filaments hairy downwards. Pistil glabrous. Capsule $\frac{3}{4}$ by $\frac{1}{2}$ in. Seeds more than $\frac{1}{3}$ in. long, thin, obovate acute, densely shaggy with white adpressed inelastic hairs, except on the large oblong areoles. (C. B. Clarke).

The flower spikes resemble hops in shape and size, and are covered with a viscid resinous exudation called *Mel* having a musky and resinous odour (Dymock).

Uses.:—The plant has a strong aromatic odor and is much used in domestic medicine by the country-people of the regions where it occurs. The bark, with an equal proportion of that of *Calophyllum inophyllum*, is applied as a fomentation in tenesmus. The juice of the bark, with an equal quantity of that of *Eclipta alba*, boiled down to one-half and mixed with old *Sesamum* oil, a few pepper corns and ginger, is heated and used as an external application in parotitis, and equal quantities of the juice of the flowers and of those of *Randia dumentorum* are smeared over bruises (Dymock).

Another species, named, *Strobilanthes ciliatus*, Nees. H.F.B.I., IV. 439. is also used for the same purposes.

918. *S. auriculatus*, Nees. H.F.B.I., IV. 453.

Vern.:—Gada-kalha; Harnapakor (Santali).

Habitat:—Behar, Central India, from Jubbulpore to Chutia Nagpur.

An underwood or small shrub, 2-6ft. Branches many, devaricate, often zigzag, quadrangular, glabrous, tips more or less hairy. Leaves variable, very often unequal, in the same pair, minutely hairy beneath. Spikes linear oblong, closely velvety, mostly terminal, solitary, $3\frac{1}{2}$ by $\frac{1}{2}$ in., quasipeduncled. Bracts soft, membranous, broader than long, $\frac{1}{4}$ - $\frac{1}{3}$ in., very obtuse, apex often recurved in fruit, persistent, with aromatic glandular hair. Calyx divided nearly to the base, velvety, $\frac{1}{4}$ - $\frac{1}{3}$ in., unequal, linear obtuse. Corolla bluish-purple, lin., curved, very slightly hairy, narrow, cylindric base very much shorter than the ventric part, limb slightly 2-lipped. Stamens and pistil very nearly glabrous. Capsule $\frac{1}{3}$ in., glabrous, 4-seeded. Seeds scarcely $\frac{1}{2}$ in., thin, orbicular, elastically white—hairy; areoles very small.

Use :—The pounded leaves are rubbed on the body during the cold stage of intermittent fever (Watt).

919. *Blepharis edulis*, Pers. H.F.B.I., IV. 479.

Vern. :—Uttangan (Pb.); Utanjan (H.); Utangan (Bomb.).

Habitat :—Punjab and Sindh.

A rigid shrub. Stems short or 1 ft. or more; branched. Leaves often $\frac{1}{2}$ in. broad, spinescent, elliptic or oblong, glaucous or pubescent. Bracts more than an inch long, spinous. Bracteoles linear, hairy, shorter than the bract. Heads few or many-fid. Corolla $\frac{2}{3}$ – $\frac{3}{4}$ in. Capsule 2-seeded. Seeds heart-shaped, flat, covered with long, coarse hairs.

Use :—Dr. Royle was the first to bring the seeds of the plant to the notice of the medical profession. He considered them to be the products of some *Urtica*. Honnigberger had these seeds examined by some botanists of Vienna who deemed them to belong to *Acanthaceae*. Dr. Burton Brown of Lahore succeeded in correctly identifying these seeds as those of *Acanthodium spicatum*, *Delile*, which is a synonym of this plant. (B. D. Basu). The seeds are considered to be attenuant, resolvent, diuretic, aphrodisiac, expectorant, and deobstruent (Dymock).

Chemical composition.—The bitter principle of the seeds is a white crystalline body soluble in water, amylic and ethylic alcohol, but insoluble in ether and petroleum ether. It gives a reddish colour with sulphuric acid, green at the margin if impure, and is best distinguished by the fine violet colour its solutions impart when brought into contact with ferric salts. With $H^+SO_4^-$ and $K^+CrO_4^-$ an agreeable odour of salicylic acid is evolved. It is associated with a substance which reduces Fehling's solution. Another white crystalline principle is present in the seeds which is not bitter, and does not give colour reactions with sulphuric acid and ferric salts. The latter crystals melted on the surface of heated mercury at 225° . The aqueous extract of the seeds contained much mucilage and vegetable albumen. The ash amounted to 7.1 per cent. (Pharma cogn. Ind., III. 41-42).

920. *Acanthus ilicifolius*, Linn. H.F.B.I., IV. 481; Roxb. 467.

Sans :—Harikasā.

Vern. :—Harkuchkānta (H. and B.); Mārāndi (Mar.); Moranna (Goa); Nivgur (Bomb.). Kalutaimulli (Tam), Holeculli (Kan.) Payinaculli (Mal).

Habitat :—Sea coast, from Malabar to Ceylon, and from the Sunderbuns to Malacca.

A common evergreen, conspicuous, shrub, gregarious of the tidal forests of India, Burma, Ceylon, the Andamans, often forming the under-wood or adventitious roots of the *Rhizophora* (Mangrove). Stems 1-5ft., in clumps little divided, terete, glabrous. Leaves large, 6 by 2½ in., oblong elliptic, toothed or pinnatifid, glossy, rigidly coriaceous. Spinous, rigid; petiole ¼ in., at times absent. Flowers in spikes, 4-16 in., terminal, commonly solitary, supported by 2 pair of bracteoles, ¼-½ in. long, terminal, sometimes axillary. Calyx ⅔ in.; sepals, 2 outer elliptic, rounded, 2 inner, broadly lanceolate, subacute. Corolla pubescent within 1¼ in. long, bright blue. Capsule bright-brown, apiculate, 1¼ by ⅔ in., shining, blunt. Seeds ¼-½ in., testa white, very lax.

Uses :—In Goa, the leaves which abound in mucilage are used as an emollient fomentation in rheumatism and neuralgia. Ainslie says that Rheede mentions the use of the tender shoots and leaves ground small and soaked in water as an application to snake-bites. Bontius commends its expectorant qualities. It is a plant in great request among the Siamese and Cochin Chinese, and is called by the latter Cay-o-ro, who consider it to be cordial and attenuant, and useful in paralysis and asthma. In the Concan, a decoction of the plant with sugarcandy and cumin is given in dyspepsia with acid eructations (Dymock).

Chemical composition.—The powdered leaves yielded to ether a quantity of fatty matter coloured strongly with chlorophyll and some soft resins. Alcohol removed more resin, an organic acid, and a bitter alkaloid. The alkaloid gave a reddish-brown colour with sulphuric acid, and was precipitated from its solutions by the usual reagents, including the volatile and fixed alkalies. Some soluble saline matter was present in the extracts of the leaves, and contributed largely to the 16.4 per cent. of total ash obtained from the air-dried leaves. (Pharmacogr. Ind., III. 43).

921. *Barleria prionitis*, Linn. H.F.B.I., IV. 482 ;
Roxb. 470.

Sans. :—Karuntaka, vajradanti.

Vern. :—Katsareyá (H.) Kántájāti (B.); Dasakarantod (Uriya); Kalsunda, korbánti, vajradanti (Bom.); Kántá-shelio (Guz.);

Piwala koranta or koreta (Mar.) ; Lál-phúl-ke-kolse-ká-pattá (Duk.) ; Vajra daul (Cutch) ; Shemmuli, varamulli (Tam.) ; Muligoranta (Tel.) ; Keletta vitla (Mal.) ; Mullu-gorante, Mullumadarangi, Kollate-vettila (Kan).

Habitat :—Tropical India, from the Himalaya to Ceylon.

There are white and blue flowered varieties growing in the Thana and Ratnagiri districts (K.R.K.)

A small perennial bush or shrub, often planted for a fence, 2-4 or 5ft., much branched. Bark white. Branchlets cylindrical, swollen above nodes, glabrous, with slender, very sharp spines in the axils, each with 3 divaricate branches, densely scabrid, lineolate sometimes puberulous. Leaves $3\frac{1}{2}$ -5in., entire, passing into bracts above, ovate, tapering below, acute, mucronate, glabrous above, slightly pubescent on veins beneath, copiously lineolate ; venation pellucid, lateral venation prominent beneath. Flowers bright, pale-orange, yellow, sessile, rather large, solitary, opposite, becoming spicate above. Bractlets linear, mucronate, stiff, almost spinous, spreading. Sepals longer than bractlets, acuminate, mucronate, glabrous, outer pair ovate, inner linear-lanceolate. Corolla about lin., tube cylindrical, pubescent outside, limb $1-1\frac{1}{4}$ in. diam. lobes nearly equal, rounded, recurved, the two lateral ones broader. Stamens 4-2, minute or sterile. Filaments of two rudimentary stamens very short. Disk annular, small, entire. Pistil glabrous. Capsule about $\frac{3}{4}$ in.-lin., ovoid, with a solid tapering beak, compressed. Seeds 2, $\frac{1}{8}$ in. diam., ovate, much compressed.

Uses :—The juice of the leaf is used by the natives in Madras in catarrhal affections of children, accompanied with fever and much viscid phlegm. The ashes of the burnt plant, mixed with conjee and water, are used in dropsy and anasarca, and also in coughs (Ainslie). In Bombay, the natives apply the juice of the leaves to their feet in the rainy season to prevent cracking. In the Concan, the dried bark is given in whooping cough, and 2 tolas of the juice of the fresh bark with milk in anasarca. Dr. Bidie observes that it acts as a diaphoretic and expectorant. A paste is made of the root which is applied to disperse boils and glandular swellings, and a medicated oil,

made by boiling the leaves and stems with sweet oil until all the water has been driven off, is used as a cleansing application to wounds (Dymock). A tooth paste made of the astringent leaves and common salt is used to strengthen the gums and in tooth-ache due to caries (Sakharam Arjun). Used in syphilitic affections as an alterative (Dr. Stewart, Cuttack). Useful in coughs and infantile diarrhœa (Dr. Thompson, Madras). The whole plant and especially the root, is much used as a diuretic and tonic medicine in Ceylon (Trimen).

922. *B. noctiflora*, Linn., H.F.B.I., IV. 484.

Habitat.:—Neilgherry Mts., Ootacamund.

A small, very prickly undershrub; branches pubescent upwards. Leaves $\frac{3}{4}$ by $\frac{1}{2}$ in., obtuse or acute, grey pubescent at first; petiole hardly any. Bracteoles $\frac{1}{4}$ – $\frac{3}{4}$ in., with simple spines or denticulate near the base. Flowers axillary solitary, 2 outer sepals $\frac{3}{4}$ by $\frac{1}{2}$ – $\frac{1}{2}$ in., large ovate acute spinous-dentate sparsely pubescent, corolla tube $1\frac{1}{4}$ by $\frac{1}{2}$ in., elongate narrowly cylindric, pubescent without, lobes $\frac{1}{2}$ in., round-ovate. Capsule $\frac{2}{3}$ in., 4-seeded.

Use.:—Dr. Mootooswamy says that in Tanjore a decoction of this plant is used as an adjunct to, and substitute for, human milk.

923. *B. cristata*, Linn., H.F.B.I., IV. 488.

Syn.:—*B. dichotoma*, Roxb. 471.

Sans.:—Jhinti.

Vern.:—Jhánti and Sada-jati (B.); Jhinli (Assam.); Tadrelu (Bazar name, bánsá siyáh) (Pb.); Gorp-jiba, kálá bánsa N.-W. P.); Koileka (Uriya.)

Habitat.—N.-W. Himalaya, Sikkim, Khasia, Burma, Central India, Nilgiri. Common in Indian gardens; often wild in and near Bombay and the Thana District (K. R. K.)

A small, perennial, erect or diffuse undershrub. Branches adpressedly yellow, hairy. Leaves oblong or elliptic, acute, yellow, hairy beneath, 3-4 by 1 in. Petiole $\frac{1}{2}$ – $\frac{1}{2}$ in. Spikes ovate, often compressed, dense, bracteoles $\frac{1}{2}$ – $\frac{3}{4}$ in., linear-lanceolate, toothed. Outer sepals $\frac{3}{4}$ in., toothed, softly hairy, glabrous, subspinescent,

ovate, acuminate or lanceolate nervose. Corolla $1\frac{1}{2}$ in., purple-blue or white; tube funnel-shaped in the upper half, lobes $\frac{1}{2}$ in., ovate. Capsule $\frac{3}{4}$ in., 4-seeded. Seeds orbicular, compressed, silky.

Uses :—The seeds are supposed to be an antidote for snake-bite, and the roots and leaves are used to reduce swelling, and an infusion is given in coughs (Watt).

924. *B. strigosa*, Willd. H.F.B.I., IV. 489.

Syn. :—*B. cœrulea*, Roxb. 471.

Vern. :—Dasee (B.) ; Wáhiti, Kála Koráuta (Bomb.).

Habitat :—Sub-Himalayan tracts eastwards, Bengal, Assam and Sikkim; also in the Bombay Presidency, and S. India.

An unarmed shrub, 3-4 ft. high. Stems more or less strigose with fulvous hairs. Leaves $4\frac{1}{2}$ -6 in. long, ovate or elliptic, acute or acuminate, the base long-decurrent on the petiole, lineolate and sparingly fulvous strigose on the upper surface, densely strigose on the nerves and veins beneath and with bulbous-based hairs intermixed, margins ciliate, main lateral nerves 6-8 pairs. Flowers in dense fulvous-hairy unilateral spikes, often crowded at the tops of the branches; bracteoles about $\frac{1}{2}$ in. long, lanceolate, hairy on the back and with ciliate margins. Calyx densely strigose; outer segments sub-equal, $\frac{1}{2}$ -1 in. long, elliptic-lanceolate, sub-acute, margins denticulate and ciliate; inner smaller, linear, acute, densely clothed, with white appressed silky hairs. Corolla $1\frac{1}{2}$ -2 in. long, blue; tube pale-blue, upper part funnel-shaped; lobes obovate-oblong, obtuse. Capsule $\frac{3}{4}$ in long, acute at the top, 4-seeded, glabrous. Seeds silky-hairy (Duthie).

Use :—The root is used by the Santals as a remedy for coughs.

925. *Neuracanthus sphærostachyus*, Dalz., H.F.B.I., IV. 491.

Vern. :—Ghosvel (M.).

Habitat :—Concan; common in Bombay island.

A stout, unbranched, rough shrub. Stem 1-2 ft. Leaves

ovate, subsessile, nearly glabrous, $4\frac{1}{2}$ by 2in., obtuse or subacute; petiole scarcely $\frac{1}{8}$ in. Spikes 1-2in., sometimes agglomerated into axillary globes, 3-4in. diam., bracts $\frac{1}{2}$ in., purplish. Calyx $\frac{1}{4}$ in., one lobe shortly 3-toothed, the other deeply 2-fid. Corolla $\frac{3}{8}$ in., limb a fine blue, obconic, subentire, plicate; lower lip of 3 very depressed triangular lobes, upper an emarginate subsimilar lobe. Anthers pubescent. Capsule $\frac{2}{3}$ in., 4-seeded. Seeds $\frac{1}{8}$ in., diamet. The plant appears rarely to seed.

Uses.—It is powdered and made into a paste which is used to cure ringworm, and the roots are administered in that form of indigestion in which fatty or saponaceous, grape-like masses are observed in the stools. They resemble *Serpentaria* in appearance, but may be distinguished by the thick covering of white, silky hairs upon the root stock. The roots have hardly any taste.

926. *Andrographis paniculata*, Nees. H.F.B.I.,
IV. 501.

Syn. :—*Justicia paniculata*, *Burm.* Roxb. 40.

Sans. :—*Kirata*; *Bhunimba*; *Mahâtikta* (king of bitters).

Vern. :—*Kiryát*, *charáyeta*, *mahátia* (Hind.); *Kálmegh*, *mahátia* (Beng.); *Olenkiráyat* (Mar.); *Kiryáta*, *olikiryát*, *kiryáto*, *kariyátu* (Guz.); *Charayetah*, *kalafnáth* (Duk.); *Nila-vêmbu*, *shirat-kuchch* (Tam.); *Nela-vêmu* (Tel.); *Nila-veppu*, *kiriyattu* (Mala.); *Nela-bevinágidâ*, *kreata* (Kan.)

Habitat :—Throughtout India, from Lucknow and Assam to Ceylon (probably introduced in some of the northern stations).

An erect annual, 1-3ft. high, branches sharply 4-angled or almost winged. Leaves 2-3in. long, lanceolate, acute, tapering to the base, paler beneath, main lateral nerves 4-6 pairs, petioles none or up to $\frac{1}{4}$ in. long. Flowers small, solitary, arranged in lax spreading axillary and terminal racemes or panicles, the whole forming a large paniculate inflorescence; pedicels distinct, gland.-pubescent; bracts $\frac{1}{10}$ in. long, lanceolate bracteoles smaller or none. Calyx $\frac{1}{8}$ in. long; segments equal linear-lanceolate, gland.-pubescent. Corolla pink, $\frac{3}{8}$ in. long, hairy outside, tube $\frac{1}{2}$ in. long, dilated below the limb. Filaments

hairy upwards, anthers bearded at the base. Capsule $\frac{3}{4}$ in. long, tapering at each end. Seeds several, subquadrate, rugose, glabrous (Duthie).

N. B.—The figure given in Bentley and Triman's *Medicinal Plants* is erroneous as to the seeds being hairy (C. B. Clarke).

Uses:—This bitter shrub is well known under the name of *Kalmegh*, and forms the principal ingredient of a household medicine called *Alui*, extensively used in Bengal. The expressed juice of the leaves, together with certain spices, such as cardamoms, cloves, cinnamon, &c., is dried in the sun, and made into little globules, which are prescribed for infants to relieve griping, irregular stools and loss of appetite. The medicinal properties of this plant are many. The roots and the leaves are febrifuge, stomachic, tonic, alterative and anthelmintic. According to Murray, the plant is very useful in general debility, dysentery and certain forms of dyspepsia. It is officinal in the Indian Pharmacopœia. "The Yanadees, a wandering gipsy tribe in the Madras Presidency, constantly carry a supply of pills made of *Creat* fresh leaves, and the pulp of the ripe tamarind, which they consider antidotal to the venom of the cobra. A pill made into a paste with water is applied to the bitten part, and some of it is put into the eyes; two pills are given for a dose every hour or two internally" (P. Kinsley, *Chicacole*, Madras). "Green leaves with the leaves of Indian birthwort (*Aristolochia Indica*) and the fresh inner root-bark of country sarsaparilla, made into an electuary, is used by native hakims as a tonic and alterative in syphilitic cachexia and foul syphilitic ulcers. I have seen many cases successfully treated by this electuary" (Morris, *Negaptam*). See Watt's *Dictionary*.

Surgeon-Major Parker, Medical Store-Keeper, Bombay, wrote :

"A preparation of this drug has, within the past few years, been largely advertised in England as a substitute for quinine and as a general powerful tonic. *Kiryat* is the native *Chiretta* and is used extensively by them as a febrifuge. Preparations—Succus, Fluid Extract, Infusion, Tincture. The whole plant is used and is collected towards the end of the monsoon and dried in the shade. The dried plant is to some extent found in the

market this reason of the year, but, as a rule, the fresh plant only can be obtained from the herbalists. Cultivated at Matunga, near Bombay. Kiryat as a substitute for Quassia and Chiretta, and as a possible means of lessening quinine expenditure seems well worthy of consideration. Chiretta is almost always adulterated and is produced, I believe, in Nepal. Can be readily cultivated from the seed in shady places" (Report, Central Indigen. Drugs Com. Vol. I p. 157.)

In the Second Report of the said Committee (p. 61) it is stated that:—

Andrographis paniculata is very extensively used in India as a remedy for malaria and also in dysentery and diarrhoea. It is not unlikely that in the bazaars it and Indian chiretta are offered rather indiscriminately. It is also the basis of an English "patent" tonic. Ward, in the *Pharmaceutical Journal* LV, page 197, remarks that there are so many bitters in England that there is little call to resort to it. But in India there are not so many, and the plant is so common that the drug is very readily available. The whole of it is medicinal. Boorsma (Mededeelingen uit S' Lands Plantentuin XVIII 66) reports that the plant may contain an alkaloid, but that he could not definitely prove its presence. The bitter principle is another substance—a crystalline glucoside, most abundant in the leaves, which Boorsma calls "andrographid." Its chemical properties were to some extent investigated by Boorsma, but no one has yet had it isolated in quantity for pharmacological examination.

Chemical composition.—According to the authors of the *Pharmacographia*:—"The aqueous infusion of the herb exhibits a slight acid reaction and has an intensely bitter taste, which appears to be due to an indifferent, non-basic principle, for the usual reagents do not indicate the presence of an alkaloid. Tannic acid, on the other hand, produces an abundant precipitate, a compound of itself with the bitter principle. The infusion is but little altered by the salts of iron; it contains a considerable quantity of chloride of sodium."

In "Food and Drugs" of Calcutta, for Jan'y 1915, Mr. Kshiti Bhushan Bhaduri, M. Sc., gives the results of his analysis of this plant as follows:—

For examination 68 Gm. of the powdered leaves and stems were taken and exhausted in a Soxhlet apparatus successively by petroleum ether, ether, chloroform, and alcohol. * * * *

The plant is very rich in chlorophyll, one portion of which is soluble in chloroform and the other not, though both are soluble in alcohol.

Examination of the Petroleum Ether Extract.

This was a viscid, brownish-yellow colored liquid from which, on keeping a small quantity of an inactive, needleshaped crystalline substance separated out, having 117° C. as its melting-point, the quantity obtained was so small that no further examination was possible. The viscid mass also contained a

little essential oil, which was separated by extraction with alkalis; the rest of it was "kalmegh resin," a portion of which was extracted by first making it alkaline with caustic potash and shaking up with ether. It can be further extracted with ether after acidification with an acid.

Chloroform Extract.

This contained, besides chlorophyll, an amorphous white substance and very little of a bitter substance, the former of which separated out on concentrating the chloroform extract. Its melting-point is 221°C . It is tasteless and insoluble in water and alcohol. It is unacted upon by acids and alkalis.

Extraction of the Bitter Principles.

For this extraction the powdered leaves and stems were exhausted in a percolator with alcohol. * * *

The residue remaining in the flask separated into two layers, one aqueous and the other solid; the former, when allowed to cool, deposited some yellow colored crystals (bitter a); the latter was boiled with water and filtered hot; from the filtrate a white amorphous precipitate was deposited having an extremely bitter taste (bitter b).

Examination of the Bitter Principle (a).

This was purified by dissolution in alcohol and fractional precipitation; the process was repeated three times. It had a pale-yellow color. When a little of the substance was heated in a test-tube it diffused a very fragrant odor. It had melting point of 206°C . * * * The substance is very soluble in ethyl and methyl alcohol, though not to the above extent in amyl alcohol. It is very slightly soluble in chloroform and ether. Benzene and petroleum ether do not dissolve it even on boiling.

It is neither an alkaloid nor a glucoside, as it neither contains nitrogen nor produces a reducing sugar after hydrolysis. It can be acetylated,—i.e., it contains hydroxyl groups; the acetyl derivative is white and insoluble in water. Its melting-point is 95°C . * * *

Examination of the Bitter Principle (b).

It was a white amorphous substance having an extremely bitter taste. It is odorless, and its melting-point is 185°C . It is practically insoluble in cold water. When a little of the substance was boiled for a long time with water, the latter acquired a slightly acid reaction. It is soluble in alcohol and chloroform. * * * The formula $\text{C}_{19}\text{H}_{51}\text{O}_5$ is given to it, * * *

The name "Kalmeghin" is proposed for it.

A white substance separated out when bitter (b) was treated with an acid.

This was washed with water and dried. It had an acid reaction and was soluble in alkalis, neutralizing it. As it was derived from Kalmeghin the name "Kalmeghic acid" was given to it. * * * The formula is $\text{C}_{14}\text{H}_{28}\text{O}_2$.

927. *A. echinoides*, Nees. H.F.B.I., IV. 505.

Syn. :—*Justicia echinoides*, Linn. Roxb. 40.

Vern. :—Peetumba (Malaly); Ran Chimani (Deccani).

Habitat.—Tropical India in the drier districts, from the Panjab and Chota Nagpore to Ceylon, common (absent in Bengal proper and humid Malabar).

An erect annual, 6-18 in. high. Stem 4-angled grooved, clothed with spreading hairs, sometimes branched. Leaves 1-3 in. long, sessile oblong or subelliptic, obtuse, sparsely hairy, base cuneate, margins ciliate, main lateral nerves 4-6 pairs. Flowers unilateral, in axillary spreading or recurved racemes shorter than the leaves, rhachis gland.-hairy; bracts $1\frac{1}{2}$ in. long, lanceolate, bracteoles much smaller. Calyx $\frac{1}{8}$ - $\frac{1}{4}$ in.; segments narrowly linear, acute, ciliate, elongating in fruit. Corolla about $\frac{1}{2}$ in. long, densely hairy outside, pink or white, the lower lip spotted with purple. Filaments slightly hairy, anthers bearded. Capsule $\frac{1}{3}$ - $\frac{1}{2}$ in. long, elliptic-lanceolate, hairy. Seeds $\frac{1}{10}$ in. long, rugose, glabrous.

Use:—The juice is given in fever (Rheede).

928. *Haplanthus verticillaris*, Nees., H.F.B.I., IV. 506.

Syn.:—*Justicia Verticillata*, Roxb. 45.

Vern.:—Kastula (H.); Jhankara (Marathi); Kálá Kiráyat; Káláyakara (Western India).

Habitat:—W. Deccan Peninsula, frequent, extending north to Mt. Aboo. Bundelkhand, Assam.

A herb, $1\frac{1}{2}$ -2 $\frac{1}{2}$ ft. high. Stems glabrous at the base, more or less pubescent upwards. Leaves $2\frac{1}{2}$ -4 in. long, ovate, acuminate acute or subobtuse, hairy on the upper surface and on the nerves beneath, abruptly cuneate at the base; main nerves 8-10 pairs, prominent beneath, petioles 1-2 in. long. Cladodes (axillary spines) 1-1 $\frac{1}{2}$ in. long, stout, 4-angled, enlarging in fruit, usually with 2 sharp spines at the apex, more or less glandular-pubescent and with spreading bristles towards the base. Flowers sessile amongst the verticils of cladodes; bracteoles longer than the calyx, subulate, finely pointed. Calyx $\frac{1}{4}$ in. long, segments lanceolate, pointed, gland.-pubescent. Corolla $\frac{2}{3}$ in. long, minutely hairy outside, limb lilac, with darker lines. Capsule about $\frac{1}{4}$ in.

long, narrowly oblong acute, glabrous. Seeds $\frac{1}{10}$ - $\frac{1}{8}$ in. long (Duthie).

929. *H. tentaculatus*, Nees. H.F.B.I., IV. 507.

Vern. :—The same as of the last.

Habitat :—Bombay ; Belgaum ; Malabar ; Central India.

A slender gland.-pubescent herb. Stems 4-angular above. Leaves 2-4 in. long, ovate, acuminate, decurrent into the petioles ; main nerves 8-10 pairs, petioles often obscure. Cladodes slender, $\frac{1}{4}$ - $\frac{3}{4}$ in. long, densely clothed, with short hairs intermixed with longer ones, the apex furnished with 2 or 3 flattened villous teeth (reduced leaves). Flowers sessile amongst the cladodes ; bracteoles subulate, shorter than the calyx. Calyx $\frac{1}{2}$ in. long ; segments linear-subulate, hairy. Corolla about $\frac{1}{2}$ in. long, blue lilac or white. Capsule $\frac{1}{2}$ in. long, oblong, pointed, hairy. Seeds smaller than those of *H. verticillaris*.

Mr. Nairne, in his ' Flowering Plants of Western India ' says of this plant, that it is " a smaller species than the last, very like it, but with short petioled oval leaves, rounded at both ends, a little hairy."

Uses :—The authors of the *Pharmacographia Indica* (Vol. III p. 47) say that the above-mentioned two plants " are used medicinally." They are given in fever.

930. *Gymnostachyum febrifugum*, Benth. H.F.B.I., IV. 508.

Vern. :—Nelamuchchala (Kan.).

Habitat :—S. Deccan Peninsula ; Mangalore.

Nearly stemless. Leaves $6\frac{1}{2}$ by 3 in., decurrent on the petiole, subentire or undulate-crenulate, above lineolate nearly glabrous or minutely sparsely setulose, beneath paler glabrous or pubescent on the nerves. Panicles puberulous, 6-12 in., in appearance radical ; flowers opposite, solitary or in very small few-fid. cymes ; bracts small, narrow ; bracteoles 0. Sepals $\frac{1}{8}$ - $\frac{1}{6}$ in., glabrous or puberulous. Corolla $1\frac{1}{4}$ in., upper half inflated, glabrous. Anthers ovate, hairy, capsule 1 in.

Use :—A decoction of the root is a febrifuge.

The root contains a bitter principle of a resinoid nature dissolving in sulphuric acid, with a purple colour. It contains, besides, a crystalline cholesterol, with small quantities of tannin and sugar (Hooper).

931. *Phlogacanthus thyrsiflorus*, Nees. H.F.B.I. IV. 512.

Vern.:—Lalbâhuk (Pb.).

Habitat:—Subtropical Himalaya, from Garhwal to Bhotan, very common. Khasia hills and Assam.

A shrub 3-7ft. Leaves large, lanceolate, glabrous, 7 by $1\frac{3}{4}$ in., tapering at both ends, subentire, densely punctulate; petiole $\frac{3}{4}$ in. Thyrses 4-12in., terminal, solitary or several, or quasi-axillary on lateral branches; peduncles short; bracts $\frac{1}{4}$ in., linear. Calyx tube $\frac{1}{8}$ in.; teeth $\frac{1}{4}$ - $\frac{1}{8}$ in., setaceous, densely pubescent. Corolla $\frac{2}{3}$ in., closely villous, orange; tube broad from the base, curved; 2-lipped, upper lip suberect, lower patent. Stamens glabrous, or slightly hairy near the base of the filaments; 2 rudiments often discernible. Style glabrous. Capsule $1\frac{1}{4}$ by $\frac{1}{8}$ in., subquadrangular, glabrous, 12-14-seeded. Seeds much compressed, orbicular in outline, densely shortly hairy, hairs elastically spreading when moistened.

Use:—In the Panjab, it is put to the same uses as *Adhatoda Vasica*, Nees.

932. *Lepidagathis cristata*, Willd. H.F.B.I. IV. 516; Roxb. 476.

Vern.:—Bhuyaterada (M.); Ot dhompo (Santal).

Habitat:—Frequent in Coromandel.

Herbs, with perennial rootstock. Stems 6-18in., branched, procumbent, quadrangular, puberulous or slightly pubescent. Leaves 1 by $\frac{1}{4}$ in., sessile lanceolate above, minutely scabrid pubescent on the nerves beneath or glabrate; linear or oblong. Inflorescence subradical globose; one or two small heads sometimes added to the lower part of the leafy branches. Bracts $\frac{1}{8}$ in., rigid in fruit. Bracteoles membranous, hairy, spinescent. Both bracts and bracteoles elliptic ovate or obovate, suddenly spinose acuminate. Calyx sub-4-partite, one segment bifid;

sepals elliptic or obovate, suddenly spinulose and densely hairy in fruit; thickened, very hairy upwards, with a mucro. Corolla $\frac{3}{4}$ in., densely hairy in bud, white, with brown or purple spots in the palate. Stamens glabrous, anther-cells one slightly above the other, papillose, ciliate. Ovary glabrous. Capsule $\frac{1}{4}$ in., 2-seeded, elongate conic, dorsally scarious, thin, irregularly tearing, only ultimately 2-valved from the subsolid tip. Seeds ovate-lanceolate, with very long hair, spreading elastically when wet, very mucilaginous (C.B. Clarke).

Uses :—A bitter herb used in fevers (Sakharam Arjun). The ash of the dry plant is employed in Chutia Nagpur as an application to sores (Revd. A. Campbell). It is applied to cure itchy affections of the skin (Dymock).

933. *Justicia Gendarussa*, Linn. f. H.F.B.I., IV. 532, Roxb. 43.

Syn. :—*Gendarussa vulgaris*, Nees.

Sans. :—Nil-nirgandi.

Vern. :—Uđi-sanbhálú, nílí-nargandí (Hind.); Jagat-madan, jogmodon (Beng.); Teo, kala-adulsa (Bomb.); Kalíshanbálí (Dec.); Karu-noch-chi, karuppu-noch-chi (Tam.); Néla-vávili, nalla-noch-chi, nalla-vávili (Tel.); Karelakkí-gidá (Kan.); Karun-noch-chi, váták-koti, vátan-golli (Mal.)

Habitat :—Throughout India, from Bengal to Ceylon.

A perennial, much branched, undershrub. Stems 2-4 ft., erect, quadrangular, thickened above the nodes, glabrous, purple. Leaves 4 by $\frac{3}{4}$ in., sometimes 5 in. long, linear lanceolate, acute at base, tapering to obtuse apex, entire or slightly and irregularly crenate, glabrous and shining, rather thick, veins prominent beneath, purple. Petiole $\frac{1}{4}$ in. Flowers rather small, white or pink, with minute red dots in the throat and lip, in opposite clusters of three short interrupted sessile terminal spikes, lower clusters usually distant. Bracts $\frac{1}{4}$ in., linear, acute. Bracteoles 0. Sepals $\frac{1}{4}$ in., linear, subulate, glabrous. Corolla nearly glabrous; tube $\frac{3}{4}$ in., upper lip notched, lower lip transversely rugose. Fruit not seen, says Triman, from Ceylon. "Lower anther-cell distinctly tailed. Capsule $\frac{1}{4}$ in., clavate, glabrous, 4-seeded" (C.B. Clarke).

Commonly used in Bombay as a garden fringe-plant. The leaves have a pleasant taste, says Triman. It is questionable if they are so; for on chewing them I find them distinctly possessed of a disagreeable oily taste (K.R. Kirtikar).

Uses:—The Malays employ it as a febrifuge (Motley, in *Hooker's Journ. of Bot.*, 1855, vol. vii. p. 166). According to Horsfield (*Asiat. Journ.*, vol. vii. p. 266), emetic qualities are ascribed to it in Java. The leaves and tender shoots, which, when bruised, emit a strong but not unpleasant odour, are, according to Ainslie (*Mat. Ind.* vol., ii. p. 68), prescribed in decoction in chronic rheumatism. Its action is apparently that of a diaphoretic. Our knowledge of its virtues rests principally on native testimony (Ph. Ind.).

An oil prepared from the leaves when applied locally is said to be useful in eczema, and an infusion of the leaves is given internally in cephalalgia, hemiplegia, and facial paralysis (Surg.-Major Houston, in Watt's Dictionary).

The juice of the fresh leaves is dropped into the ear for ear-ache, and into the corresponding nostril on the side of the head affected with hemicrania (P. Kinsley, in Watt's Dictionary).

934. *J. procumbens*, Linn., H.F.B.I., IV. 539. Roxb. 45.

Vern.:—Ghāti-pitpáprá, pitpápada (Bomb.)

Habitat:—South Western India, extending as far north as the South Konkan.

Stems diffuse, slender, with many divaricate branches, rooting at lower nodes, furrowed, nearly glabrous, with a few long hairs below the nodes, or with spreading hair. Leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in., oval or ovate-oval, obtuse at both ends, entire or slightly crenate, softly hairy-pubescent on both sides; elliptic or lanceolate, says C. B. Clarke. Flowers very small, in rather dense cylindric terminal spikes; $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long. Bractlets linear, long, ciliate. Sepals linear-filiform, strongly ciliate, as long as bractlets, one shorter or absent. Lower lip of Corolla broader than long, lobes shallow, obtuse. Capsule $\frac{1}{4}$ in., with a short, solid base. Flowers pale, violet, pink, the lower lip spotted with darker pink. The flowers vary in size, being larger than the hill forms.

Uses.:—Used as a substitute for true *Pit-pápra* (*Fumaria*), which it resembles in having a faintly bitter, disagreeable taste (*Dymock*). The juice of the leaves is squeezed into the eye in cases of ophthalmia (*Ainslie*).

935. *Adhatoda Vasica*, *Nees*, H.F.B.I., IV. 540.

Syn.:—*Justicia Adhatoda*, *Linn.*, *Roxb.* 43.

Habitat.:—From the Punjab and Assam to Ceylon and Singapore.

Sans.:—*Arusak* (not angry), *Vása* (giving perfume), *Vrishá* (chief), *Sinha-mukhi* (lion-mouthed), *Sinha-parñi* (lion-leaved), *Sinhakatpat* (lion-eradicator), *Ruksha* (dry.)

Vern.:—*Arusha*, *adulasá*, *adulasó* (*Hind.* and *Bom.*); *Bâkas*, *vásaka* (*Beng.*); *Bhekkar*, *basúti*, *tora bujja*, *bashang arús*, (*Himalayan names*); *Bansa* (*Pers.*); *Adhadode* (*Tam.*); *Adasara* (*Tel.*); *Atalotakam* (*Mad.*).

An evergreen, dense shrub, 4-8ft., sometimes arborescent, even 20ft., with a fetid smell, says *Kanjilal*. The Bombay plant has no fetid smell. Leaves 4-8in., entire, minutely pubescent especially when young, lateral nerves 8-12 pair. Petiole 1-1½in. Inflorescence a dense, short, pedunculate, bracteate spike, 2-4in. long, terminal often several together. Bracts ¾ by ¼in., ovate or elliptic sessile; bracteoles ½ by ¼in., falcate, oblong. Calyx ½-¾in. deeply 5-lobed, lobes equal, lanceolate. Corolla-tube ⅓-½ by ¼-½in. broad, white, lower portion short and funnel-shaped; lower lip with two lines of oblique purple bars. Stamens 2; filaments dilated; anther-cells acute at the apex, scarcely spurred at base. Capsule ¾in. clavate, longitudinally channelled, pubescent, 4-seeded. Seeds ½in. diam., glabrous, tubercled. Wood white, moderately hard. Every part of the plant is exceedingly bitter.

Uses.:—The leaves and the root of this plant are considered a very efficacious remedy for all sorts of coughs, being administered along with ginger. "The medicine was considered so serviceable in phthisis that it was said no man suffering from this disease need despair as long as the *vasaka* plant exists"

(U. C. Dutt.) It is often administered along with honey, the fresh juice or a decoction with pepper being made into a cough mixture. The *Pharm. Indica* states that strong testimony has been given in favor of its remedial properties, drawn from personal experience, in the treatment of chronic bronchitis, asthma, &c., when not attended with febrile action. The flowers and the fruit are bitter, aromatic and antispasmodic. The fresh flowers are bound over the eyes in cases of ophthalmia. "The flowers, leaves, and root, but especially the first, are supposed to possess antispasmodic qualities." "They are bitterish and sub-aromatic and are administered in infusion and electuary as anthelmintic" (Ainslie). The leaves are used as a cattle medicine; in the case of man for rheumatism; and the flowers for ophthalmia (Stewart).

The leaves dried and made into cigarettes are smoked in asthma and their juice is used for diarrhoea and dysentery. The powdered root is used in Mysore by native doctors in cases of malarial fever. It has expectorant and antispasmodic properties, and its use has been recommended in the treatment of colds, coughs, asthma, phthisis, and even diphtheria, in which it deserves more extended trial. It is said, also, to be a valuable antiseptic, antiperiodic, and anthelmintic. Drury mentions that the leaves given in conjunction with those of *Solanum trilobatum* and *S. xanthocarpum* are employed by the Vythians internally in decoction as anthelmintic. In Bengal and Upper India also the leaves are smoked as cheroots for asthma. In Assam, the juice of the plant is considered the best preparation. It is extracted from the young shoots and flowers by first washing them in an ordinary brass or iron vessel over a fire and then applying pressure. It is taken with *ghi* or honey. In Central India, the plant is one of the ingredients used for preparing the mixture in which infants up to the age of four months are bathed. The Burmese pound the leaves and use them as a poultice for fresh wounds, while an infusion of the leaves and twigs is given internally for coughs. In the Tenasserim district, the leaves are used externally in cases of swellings, bleeding of the nose, and headache; and internally for fever, colic, asthma, and dysentery. It is prescribed in a spirit for wealthy persons suffer-

ing from certain humours. The spirit is prepared with this as a chief ingredient and several other articles, and it is said to strengthen the chest and throat. It has been known to cure bleeding of the lungs by taking a sweetened decoction of the plant, and the preparation is an excellent mixture for children and others with bad coughs and colds.

Dr. Rusby states that "it appears to be toxic to all forms of life, in direct proportion to their lowness in the scale, and that this property is unique among plants. * * The leaves are found to completely destroy the lower aquatics and to prevent their re-appearance. Laid upon fruits and other perishable substances they, to a great extent, prevent mould and decay. They check the development of parasitic diseases on vegetation. The very extended use of this plant in India in the treatment of tuberculosis and other respiratory diseases may be founded upon this property."

"It is probable," writes Dr. Watt, "we have in *Adhatoda* an antiseptic at the door of every Indian peasant. An aqueous solution of the alcoholic extract of the leaves was tried upon flies, fleas, mosquitoes, centipedes and other insects, and in every case the application met with poisonous results."

There seems to be a wide field of usefulness for this remarkable plant in the treatment of diseases depending upon the presence of fungi, bacteria, etc.

In the Second Report of the Indigenous Drugs Committee, p. 35, we read.—

"In the experiments so far done (see *Pro. Indigenous Drugs Committee*, Vol. I., pages 387-418) Captain Childe, who used 30 minim doses of the tincture, reported that it did well in cases of bronchitis, especially in chronic bronchitis, but no benefit resulted in cases of phthisis. Lieutenant-Colonel Nailer reported that the drug was administered in chronic bronchitis, bronchial asthma and phthisis, and that he would not recommend its use in such cases. Lieutenant-Colonel Lee reported that it was a useful expectorant. Major Crawford reported that the drug was tried in several cases in the form of a tincture; it acted well in the latter in the stages of acute bronchitis. Assistant Surgeon W. D. Innes reported that the drug was used in cases of chronic bronchitis, its action was not definite and not as effective as some of the drugs now in ordinary use. Captain Stewart, who used half drachm in a few cases of bronchitis and pneumonia, reported that it is as effective as ipecacuanha. Major Frenchman, who used the tincture in doses varying from m. xx

to dr. i, reported that in 10 out of 24 cases of chronic and subacute bronchitis and bronchial catarrh, it was found efficacious and successful. It failed in 3 cases of phthisis that he tried. In 2 out of 3 cases of asthma it acted well. The full dose of dr. i causes nausea and griping, and, therefore, had to be reduced to m. xx. which was found sufficient."

The analysis of the leaves reveals certain principles resembling those found in tobacco, as, for instance, an odorous volatile principle, an alkaloid, but not volatile like nicotine, one or more organic acids, sugar, mucilage, and a large percentage of mineral salts.

The chemical analyses have revealed the presence of an alkaloid vasicine as the active principle, and this result has been confirmed by the physiological as well as chemical tests of Dr. Boorsma of Java. A tartrate of vasicine is now an article of commerce on the Continent and future possibilities may be expected of it in medical science.

The various portions of the plant available in the Office of Reporter on Economic Products were analysed by Mr. Hooper, with the following results:—

	Moisture.	Ash.	Spt. ext.	Vasicine.
Leaves ...	7.9	20.0	13.3	.39
Bark ...	10.2	14.0	14.4	.35
Root ...	6.7	4.6	3.4	traces.
Root-bark ...	5.8	12.4	11.2	.58

The alkaloidal content of the bark is here seen to approach very closely to that of the leaves. The question of cost in collecting these two products would have to be considered, and it is evident that the separation of the bark from the stems would entail more labour than the simple method of gathering the leaves from the shrub. In other medicinal shrubs, such as Buchu and Senna, when the leaves are official, it is not customary to use the bark of the plants in addition to the leaves.

The following results were obtained from quantitative experiments on the powdered barks:—

	From Young Plants.	From Old Plants.
Moisture ...	12.1	10.2
Spirit extract ...	15	16.2
Soluble in water ...	7.2	7.5
Resins ...	7.8	8.7
Total Ash ...	7.0	12.2
Sand ...	2.8	7.2
Pure Ash ...	4.2	5.0

It will be seen that the root-bark from the older plants has a higher percentage of acrid and bitter resinous matters than that from the younger plants. In this connection attention should be drawn to the remark made some years ago by Mooden Sheriff of Madras. In the Supplements to the Pharmacopœia of India, page 364, he reports that he found that the older the plant, the more active is the bark in its effects.

936. *Rhinacanthus communis*, Nees., H.F.B.I.,
IV. 541.

Syn.:—*Justicia Nasuta*, Linn., Roxb 40.

Sans.:—*Guthika-parni*.

Vern.:—Palik-juhia, pálak-juhi, jui-pani (Hind.); Júi-pana (Beng.); Pulcolli, puzhuk-kolli, pushpa-kedal, nagamallicheheti (Mal. S. P.); Gâchkaran (Bomb.); Gajakarní (Mar.); Kabútar-ka-jhár (Dec.); Naga-malli (Tam.); Nargamollay, nága malle (Tel.); Naga-mallige (Kan.).

Habitat:—Cultivated throughout India; perhaps wild in the Deccan Peninsula.

A much-branched shrub. Leaves entire, 3-4 by $\frac{3}{4}$ -1 $\frac{1}{2}$ in., usually narrowed at both ends, oblong or ovate-oblong, pubescent or glabrate; margins undulate; petiole $\frac{1}{2}$ in. Cymes terminal and on short lateral branches, dusky. Flowers often clustered. Bracts and bracteoles 0- $\frac{1}{2}$ in., linear. Calyx densely pubescent, $\frac{1}{10}$ in. Corolla-tube 1 by $\frac{1}{16}$ in., lobes $\frac{1}{2}$ in., 3 lower, each twice as broad as the shortly bifid upper. Capsule clavate 4-seeded, stalk long, solid cylindric.

Uses:—The fresh root and leaves, bruised and mixed with lime juice, are a useful remedy for ringworm and other cutaneous affections. The seeds also are efficacious in ringworm. (Ainslie and Royle.) The root-bark is a remedy for the affection of the skin which the Europeans call Dhobie's itch, Malabar itch, &c. (Dymock).

In Sind, it is said to possess extraordinary aphrodisiacal powers, the roots boiled in milk being much employed for that purpose by native practitioners (Murray).

The roots are believed in some parts of India to be an antidote to the bite of poisonous snakes. Of late, it seems to have attracted considerable attention in Europe, on account of its reputed value in the treatment of ringworm. It seems, however, to be universally used with good results in cases of *Tinea circinata tropica*, although its utility in ordinary ringworm (*Tinea tonsurans*) seems very doubtful. Dr. Liborius analysed the root at his laboratory at Dorpat, and found that it contained a substance which he called *rhinacanthin*, and which resembled *chrysophanic* and *frangulic* acids in its antiseptic and antiparasitic properties (Watt).

Chemical composition.—Liborius has analysed the root in the Dorpat Laboratory, finding in it 13.51 per cent. of ash and 1.87 per cent. of *Rhinacanthin*, a quinine-like body, besides the ordinary constituents of plants.

Rhinacanthin is a dull cherry-red resinous substance, which contains no nitrogen, and does not reduce copper solution. It seems to be related to chrysophanic and frangulic acids. Two ultimate analyses gave a mean of carbon 67.55 per cent., hydrogen 7.36 per cent. The formula $C_{14}H_{13}O_4$ corresponds with 67.20 C and 7.20 H. Its presence in the plant is said to be limited to certain intercellular spaces occurring in the bark, the cellular tissue of of this part appearing to be filled with an intensely red substance, supposed to consist of a compound of rhinacanthin with an alkali. It is obtained by exhaustion of the powdered root fibres with absolute alcohol. Rhinacanthin has the peculiarity of forming with bases beautiful red compounds that are easily decomposed by certain neutral solvents, such as petroleum spirit, which dissolves the rhinacanthin and assumes a yellow colour (*Pharm. Zeitch f. Russl.*, Feb. 1881; *Year Book Pharm.*, 1881, p. 197.)

937. *Ecbolium linneanum*, Kurz., H.F.B.I., IV. 544.

Syn.:—*Justicia Ecbolium*, Linn., Roxb. 38.

Vern.:—Uda-jati (H.); Rán-aboli, Dháktaádulsa (Mar.).

Habitat:—S. Deccan Peninsula.

A low shrub, branches erect, cylindrical, thickened above the nodes, glabrous. Leaves large, $4\frac{1}{2}$ -6in., oblong, oval or lanceolate, tapering to base, acuminate, acute, entire to very faintly crenate, glabrous, shining and dark green above, paler and densely finely pubescent beneath. Petiole obscure. Flowers large, sessile in opposite pair. Spikes nearly sessile, 2-10in., 4-sided. Bracts $\frac{3}{4}$ -7in., oblong-oval, aristate, glandular-puberulous, ciliate, semi-membranous, reticulate-veined. Bractlets subulate. Sepals linear, acuminate, glandular-pubescent. Corolla-tube $1\frac{1}{2}$ in., slightly dilated and laterally compressed at throat, deflexed, hairy outside, upper lip about $\frac{1}{2}$ in. very narrow, strongly reflexed, lower lip about $1\frac{1}{2}$ in. diam.; lateral lobes oblong, acute, middle one oval obtuse. Capsule pubescent. Seeds white.

The colour of flowers, is, says Trimen from Ceylon, "pale bluish-green." J. D. Hooker says "greenish-blue or purple."

Use:—The roots are prescribed in jaundice and menorrhagia (Dymock).

938. *Graptophyllum hortense*, Nees., H.F.B.I., IV. 545.

Syn.:—*Justicia picta*, Roxb. 39.

Vern.:—Pandhara adulsa (variegated variety); Kala adulsa (Dark variety)—(Konkan).

Habitat:—Cultivated in gardens throughout India and Malaya; where wild, uncertain.

A large elegant, ramous shrub, common in gardens, and one of our finest ornaments. I never saw it wild; it is in flower most part of the year. Leaves opposite, short-petioled, ovate-lanceolate, smooth pointed, generally variegated with large white spots, though sometimes of a uniform green, and we have a variety with the leaves uniformly ferruginous. Racemes terminal, short, erect, smooth. Flowers large, generally of a beautiful crimson colour. Bracts opposite; below three or four-flowered; above one-flowered. Corolla throat compressed, divisions of the border soon after they expand becoming spirally revolute, with their inside wrinkled, and beautifully ornamented with small chrysalline specks (Roxburgh).

Uses:—In the Konkan, it is used in the same manner as Adhatoda Vasica, *Nees*. According to Rumphius, the variegated variety is used pounded with the milk of the cocoanut to reduce swelling. Loureirs states that the leaves are emollient and resolvent, and notices their use as a cataplasm to inflamed breasts caused by obstruction to the flow of milk (Dymock).

939. *Rungia repens*, *Nees*, H.F.B.I., IV. 549.

Syn.:—*Justicia repens*, *Linn.*, *Roxb.* 44.

Vern.:—Kodaga saleh (Tam.); Ghátipitpápada (Bomb.).

Habitat:—Common throughout India, from the Punjab and Bengal to Ceylon.

A procumbent herb, rooting, ramous weed, says Clarke. Stems usually decumbent, says Triman, and rooting at the base, thin, erect, slender, cylindric puberulous. Branches quadrangular, pubescent or nearly glabrous. Leaves oblong or lanceolate-linear, 1-2in., on very short petiole, acute at base, subacute at apex, entire glabrous, densely lineolate above (so as to be rough when dried). Spikes long, 1½-5in., 4-sided, erect, terminal. Bracts much imbricated, all similar, nearly ¼in., broadly-oval, obtuse, sharply mucronate, pubescent, very slightly ciliate,

broadly bordered, with white scarious margins. Bractlets linear-lanceolate, acute. Capsule $\frac{1}{6}$ in., oblong-ovoid, pubescent. Seeds with concentric furrows. Anther-cells superposed, lower white tailed. Corolla white, with rose or purple spots (C. B. Clarke). Ovary glabrous; style thinly hairy at base.

Flowers, says Trimen from Ceylon, "violet, with red dots, thin dots in the throat."

Uses:—The leaves resemble, both in smell and taste, those of thyme; while fresh, they are bruised, mixed with castor oil, and applied to the scalp in cases of tinea capitis (Ainslie).

The whole plant, dried and pulverised, is given in doses of from 4 to 12 drams in fevers and coughs, and is also considered a vermifuge (Drury).

940. *R. parviflora*, Nees., H.F.B.I., IV. 550.

Syn:—*Justicia pectinata*, Linn. Roxb. 44.

Sans.:—Pindi.

Vern.:—Tavashu mûrunghie; punakapândú (Tam.); Pindi kunda (Tel.); Bir lopong arak (Santal.).

Habitat:—Throughout India.

Annual; erect stems, slender, with opposite lines of pubescent, divaricately branched; upper leaves $2\frac{1}{2}$ -4 in., linear, much tapering to base, obtuse, slightly undulate, glabrous, lanceolate, petiole obscure, lower leaves oval or rotundate, distinctly petioled. Spikes very short, about $\frac{1}{4}$ in. flat, ranks of empty bracts in one plane, $\frac{1}{4}$ in., linear oblong, mucronate, with a very narrow margin, glabrous, slightly ciliate, floral bracts about $\frac{1}{8}$ in., oval, obtuse, slightly mucronate, with the scarious margin wider, glabrous, ciliate; bractlets narrower than the bracts. Sepals linear lanceolate. Corolla $\frac{1}{4}$ in., small (Trimen). Flowers white, with blue lines on lower lip. "Capsule $\frac{1}{2}$ in., seeds small, minutely verrucose; spikes nearly all terminal, markedly one-sided" (C. B. Clarke).

Uses:—The juice of the small and somewhat fleshy leaves is considered cooling and aperient and is prescribed for children suffering from small-pox in dose of a tablespoonful or two twice daily. The bruised leaves are applied to contusions to relieve pain and diminish swelling (Ainslie).

Among the Santals the root is given as a medicine in fevers (Revd. A. Campbell).

N.B.—In Bombay, the above two species are sometimes employed by the shopkeepers to adulterate Fumitory (*Fumaria officinalis*); hence they are also called pitpáprá there (K. R. K.).

941. *Dicliptera Roxburghiana*, Nees., H.F.B.I., IV. 553.

Vern.:—Kirch, Semni, Lakshmana (Pb.); Bouna (Simla).

Habitat:—Frequent in the plains of N. India, from the Punjab to Assam, Silhet and E. Bengal, Bhotan.

Diffuse herbs. Stems 1-3ft., elongate, very nearly glabrate. Leaves $2\frac{1}{2}$ by 1in., base cuneate, elliptic, acute, obscurely pubescent or glabrate. Petiole $\frac{1}{4}$ in. Flowers in clusters, axillary and terminal, sessile, more rarely shortly peduncled. Bracts nearly $\frac{1}{2}$ by $\frac{3}{8}$ in., often 3-nerved, ciliate, thinly pubescent, cuneate-elliptic obovate, apiculate, not acuminate. Corolla $\frac{3}{4}$ in. Capsule $\frac{1}{4}$ in., clavate, puberulous or glabrous. Seeds conspicuously verrucose.

Use:—According to Stewart, the plant is used medicinally in the Punjab.

It is said to be a useful tonic (Watt).

942. *Peristrophe bicalyculata*, Nees., H.F.B.I., IV. 554.

Syn.:—*Justicia bicalyculata*, Vahl., Roxb 42.

Vern.:—Nasa bhaga (B.); Barge khode baha (Santal.); Kali-andi jahria (Merwara); Ghátpitta-pápada (Mahr.); Atreelal (Hind.); Nazpat (Sind.); Chebira (Tel.).

Habitat:—Tropical and Subtropical India, from the Punjab and Sind to Assam and Madras.

Erect spreading herbs, thinly patently hairy. Leaves 2 by 1in., ovate, acuminate. Petiole $\frac{1}{4}$ in. Each pair of bracts long-petioled. Bracts $\frac{1}{2}$ by $\frac{1}{2}$ in., unequal, linear or linear-spathulate, acute mucronate. Panicles lax, divaricate. Corolla $\frac{1}{2}$ - $\frac{1}{4}$ in. Anther cells ovoid, remote, ovoid, not linear, which latter is the characteristic of the other species of genus *Peristrophe*. Capsule $\frac{1}{8}$ - $\frac{1}{4}$ in. Seeds minutely glandular, papillose.

Uses:—According to Rheede, the whole of the plant, macerated in an infusion of rice, is said to be a useful remedy in poisonous snake-bites. Dr. Sakharam Arjun, in his *List of Bombay Drugs*, says that this plant is supposed to have the properties of *Fumaria parviflora* and is used in its stead, but has not the bitterness of that plant.

N. O. VERBENACEÆ.

943. *Lantana indica*, Roxb., H.F.B.I. IV., 562.
Roxb. 488.

Vern.:—Ghaneri ; Pāpar-dani (Ajmer).

Habitat:—Roxburgh writes:—"A native of Mysore, from thence Dr. B. Heyne sent the seed to the Botanic garden at Calcutta, where the plants thrive luxuriantly, and blossom during the rains."

It is common throughout India and Ceylon in the warmer parts; on the river banks of Bengal one of the commonest weeds.

A shrub, 3-8 ft. high; branches roughly hairy, long and straggling, 4 angular, sometimes prickly, yellowish brown. Leaves $1\frac{1}{2}$ - $2\frac{1}{2}$ in. long, opposite or in whorls of 3, ovate, acute or subobtusate, crenate-serrate, rugose and finely pubescent on upper surface, softly white-pubescent or subvillous beneath, narrowed or somewhat rounded at the base, petioles $\frac{1}{4}$ - $\frac{3}{8}$ in. long. Flowers inodorous, sessile, arranged in axillary peduncles heads or spikes $\frac{1}{2}$ - $\frac{3}{4}$ in. long and elongating in fruit; peduncles 1- $3\frac{1}{4}$ in., usually in opposite axils, 4-angled, thickening upwards; bracts up to $\frac{3}{8}$ in. long, ovate, acuminate, softly hairy on both sides. Calyx $\frac{1}{8}$ in. long, truncate, membranous, densely hairy. Corolla with a pale purplish limb $\frac{1}{8}$ in. across, hairy outside; tube $\frac{1}{4}$ in. long, yellowish; lobes 4, rounded. Filaments very short. Ovary glabrous. Drupe purple when ripe, enclosed in the thin transparent calyx (Duthie).

Uses:—Mr. Duthie (*Flora of the Upper Gangetic Plain*, Vol. II. p. 216) writes:—"The leaves are regarded by the natives as a cure for snake-bite."

Indraji, in his valuable book "*Vanaspati Shastra*" speaks

about some of the medicinal properties of the roots, leaves and flowers of *Lantana Indica*.

944. *L. Camara*, Linn., H.F.B.I., IV. 562.

Vern:—Ghaneri (M); Chadurang (Kan) (According to Talbot. I. P. Fleiderer gives the following Kanarese equivalents of the plant—Natahu, hesigetin, kasutihuvina-gida). Arippu (Mal).

Habitat:—A native of America, run wild in many parts of India. "Shade ultimately kills it, but it has the power of scrambling up the branches of low trees and so reaching the hight. Its rapid diffusion has been much helped by birds, which are fond of the berries." (Trimen).

A gregarious straggling scandent shrub. Branches 4-sided with recurved prickles. Leaves simple, ovate acute. Flowers in small head, pretty, pink-orange or lilac, and of many shades in the same plant. Bracts linear small. Calyx small, membranous. Corolla-tube slender, limb spreading, lobes unequal. Ovary 2-celled; Drupe fleshy. Seeds without albumen.

Uses:—In Mexico, the leaves of a species of *Lantana*, when boiled with barley, are given to women in childbirth. Another species of *Lantana* is much used to relieve indigestion.

In Vol. 16 of the *Pharmaceutical Journal* and transactions published in the year 1885 there appears a short article where it is stated that a new alkaloid named "Lantanine" was discovered by Dr. Negrete, in *Lantana brasiliensis*, a plant which was used by Dr. E. Buiza in the central hospital at Lima, as an antipyretic; it stated that "Lantanine" like Quinine, depresses the circulation and lowers the temperature. Intermittent fevers which have not yielded to treatment with Quinine, have given way under the use of 2 grams of lantanine.

On page 497 of *Apothekar zeitung* of 1909 it is stated that the leaves of *Lantana Odorata* are used in West Indies and South America for aromatic baths in rheumatic complaints, also as infusions for catarrhal diseases and as gargles.

In *Chemisches Central Blatt* of 1905 on page 307 it is stated that the fresh bark of the stem of *Lantana Camara* contains 60% water, 6.25% ash, 0.18% of a crystalline substance (Lantanine) 0.054% of a rubber-like substance, 1.705% resin, 2.21% resinic acid but no tannic acid; the bark of the root of *Lantana Camara* is supposed to contain tannic acid on the other hand.

Bacon writing in the *Philippine Journal of Science* in 1909 about the oil of *Lantana Camara* states that it possesses a pleasant odour and that the plant flourishes with such extraordinary profusion in the Philippines that it would undoubtedly pay to cultivate it.

Prof. D. D. Kanga, M. A., of Elphinstone College, Bombay, who has analysed this plant, reports as follows :—

The flowers were collected in the months of August and September from places in the neighbourhood of the Science Research Institute, Bangalore, dried in air and distilled with steam.

The leaves were also locally collected in the month of January 1912, powdered and extracted with warm alcohol for the determination of the constituents; the alcoholic extract was steam-distilled, when an oil came over along with a little free volatile acid. 28.26 grams of the fresh flowers lost 22.2 grams. of water on drying at 110°C. Hence moisture 78 per cent.

The yield of the oil from the air-dried flowers was 0.077, while that from the leaves was 0.2 per cent.

The following table gives the physical properties and some chemical constants of the oils :—

	Oil from the dried flowers.	Oil from the fresh flowers.	Oil from the leaves.	Oil from the leaves of the South American plant, according to Messrs. Schimmel and Co's. Report, Oct. 1909.
Colour ...	Yellow ...	Yellow ...	Yellow ...	Pale-yellow
Odour ...	Powerful, per- sistent and pleasant, re- minding of sage.	Powerful, per- sistent and pleasant re- minding of sage.	Powerful, per- sistent and pleasant, re- minding of sage.	Pleasant, re- minding of sage.
Yield ...	0.07 % by weight.	...	0.2 % by weight	Varying great- ly according to age. One yield was 0.07% and another 0.245% by volume.
Specific ... gravity.	D _{26°} 0.915 D _{15°}	...	D _{24°} 0.92114 D _{24°}	D _{30°} 0.9132 D _{4°}
Refractive Index	n _D ^{26.5°} 1.4987.	n _D ^{26.5°} 1.5031	n _D ^{70°} 1.48933	n _D ^{30°} 1.4913
Optical Rotation.	[α] _{Hg} =green +23.9°	...	[α] _D +1.96°	[α] _D ^{30°} +11.5°
Saponifica- tion Value	10	...	...	...
Acetyl value	43.6	...	...	..

When subjected to fractional distillation under a pressure varying from 45 to 55mm., the following fractions were collected

from the oil from the leaves, and the refractive index of each fraction determined :—

Fractions	B. P.	$n_D^{31.5}$
1. ...	145°—154°	1.48395
2. ...	154°—165°	1.48914
3. ...	165°—180°	1.49485
4. ...	above 180°	1.49703

The results obtained are very similar to those recorded for the oil from the leaves of the South American plant (Phillipines).

To summarise :—

Neither the leaves, the stems nor the roots of *Lantana Camara* were found to contain an alkaloid.

The aqueous liquid was found to contain a large quantity of tannin and sugar; the solution in which sugar was found was glucosidic in character.

The petroleum extract of the green resin was found to contain a mixture of resin acids in very large quantities.

The neutral portion of the petroleum ether extract was found to contain very likely a mixture of palmitic and stearic acids, mixture of oleic and Emucic acids and very probably a phytosterol.

The ether extract of the resin was found to contain a crystalline substance, which is a glucoside; the formula of this substance may very probably be $C_{27}H_{42}O_4$.

The oil yielded by flowers has got a pleasant and very powerful and persistent odour.

945. *Lippia nodiflora*, Rich., H.F.B.I., IV. 563.

Sans. :—Vashira.

Vern. :—Bhin-okra (H.); Mokna, búkan, jalnim, jorakh, mundi, boken butee, chamiara (Pb.); Ludra (P.); Wakan (Sind.) Tan (Dec.); Ratolia (Bomb.); Podutalei (Tam.); Bokenaku (Tel).

Habitat :—Abundant in wet places throughout India.

An annual herb, roughly pubescent, creeping, minutely strigose, extending 6-30 in., much branched, often rooting from the nodes. Stems prostrate, sub-quadrangular, glabrous. Leaves numerous, small $\frac{3}{4}$ -1 $\frac{1}{4}$ in., obovate, narrowed to the sessile base, toothed at top sharply, rather thick, minutely punctate. Flowers $\frac{1}{10}$ in. long, pink or white, crowded in axillary, long stalked, oblong-ovoid, bracteate heads. Heads at first nearly globose, but becoming spicate and oblong in fruit. Peduncles 1-3 in. from axil of only of each pair of leaves. Bracts ovate, acute, or subacute. Heads $\frac{1}{2}$ by $\frac{1}{4}$ in., ovoid or cylindric. Calyx

minute, 2-fid, hairy. Corolla-tube cylindric, slender, mouth 2-lipped, lower lip rather longer, pinkish-purple to white (C B. Clarke). Filaments and style very short. Fruit hardly $\frac{1}{12}$ in. diam., nearly dry.

"Flowers all the year round, very pale violet-pink" (Trimen)
 "Stamens unequal pair, included. Ovary 2-celled, stigma capitate separating into two 1-seeded nutlets (Collett).

Uses:—The plant is officinal, and considered cooling. The tender stalks and leaves are slightly bitter, and prescribed in the form of an infusion to children suffering from indigestion, and to women after delivery. (Ainslie). It is used in Bombay as a demulcent in cases of gonorrhœa. A poultice composed of the fresh plant is a good maturant for boils. (Dymock. Honnigberger considered it valuable in ischury, stoppage of the bowels and pain in the knee-joint. In Mexico the leaves of several species of *Lippia*, called 'oregano' are very much used to flavour food. It is cooked with fish, sausage and other food.

946. *Verbena officinalis*, Linn., H.F.B.I., IV. 565.

Vern.:—Pámukh, karaita (Pb.); Shamuki (Pushtu).

Habitat:—Himalaya from Kashmir to Bhotan. Bengal Plain to the Sunderbunds.

An erect, more or less pubescent, perennial herb. *Stems* 1-3ft. high, decumbent at the base, branched 4-sided puberulous. *Leaves* 2-4 in. long, variously lobed, narrowed to the base, lower ones stalked, pinnatifid or coarsely toothed, more or less pubescent and usually hoary on the nerves beneath; upper sessile, usually 3-partite. *Flowers* $\frac{1}{4}$ in. long, sessile in dense bracteate heads which elongate as the fruit ripens into slender spikes up to 10 in. long; bracts ovate, acute. *Calyx* twice as long as the bracts and half as long as the corolla-tube, minutely 5-toothed, glandular-hairy. *Corolla* blue or lilac, hairy; limb spreading, about $\frac{1}{8}$ in. diam., lobes subquadrate, throat hairy. *Fruit* dry, ultimately separating into 4 one-seeded nutlets pyrenes 3-ribbed $\frac{1}{15}$ - $\frac{1}{20}$ in., oblong, smooth dorsally, their under faces with minute white flaking cells.

Uses:—The fresh leaves are used as febrifuge and tonic, and as rubefacient in rheumatism and diseases of the joints;

the plant is officinal at Lahore, being depurative and febrifuge (Stewart). Mahomedan physicians consider it tonic and astringent, useful in paralysis and amenorrhœa, and that a plaster of the leaves promotes the healing of wounds. An ointment is recommended for swelling of the womb, and a vinegar in skin diseases. Cochin-China, the plant is considered useful in nervous complaints and as a deobstruent in dropsy (Dymock).

The root is believed to be a remedy for scrofula and snake-bite. At one time it was worn in Europe as a charm against evil, and for good luck. In Tuscany it is said to be still employed as a poultice for liver complaints, and taken internally for the same disease and for dropsy.

947. *Callicarpa arborea*, Roxb., H.F.B.I., IV. 567; Roxb. 131.

Vern.:—Ghivala (Cutch); Bándün (Kol.); Dom koto-koi (Santal); Bogodi, gogdi (Karwar); Boropatri (Uriya); Sakrela (Mal.); Gœhlo (Nepal); Sunga (Lepcha); Khoja (Ass.); Makanchi (Garô); Ghiwala, dera, shiwali (Kumaun); Bormala (Beng.).

Habitat:—N. India, in the lower hills, from Kumaon to Assam, common in the Sikkim Terai; Rajmahal, E. Peninsula from the Khasia Terai and Manipur to Singapore.

A moderate-sized tree, attaining 40 ft. Branches petioles, underside of leaves and inflorescence densely grey tomentose, with short soft stellate hairs. Bark brownish, rough; wood light, brownish white, moderately hard, even-grained. Leaves ovate or elongate-elliptic, acuminate, glabrous above; blade 6-12 in. Petiole 1-2½ in. long; secondary nerves 8-12 in. Flowers lilac or pale-purple with an unpleasant smell (Brandis). Cymes large, spreading. Peduncle 1-2 in. long. Calyx 20 in., puberulous. Corolla 1 in., long, Berry 10 in. diam., purple, ultimately black.

Uses:—The bark is aromatic and bitter, and is applied in decoction in cutaneous diseases. It is considered tonic and carminative (Watt. ii 26).

948. *C. lanata*, Linn., H.F.B.I., IV. 567; Roxb. 131.
Syn.:—*C. Wallichiana*, Walp.

Vern. :—Bastra (H.); Massandari (B.); Aisar (Bom.); Koat-Komul (Tam.); Tondik-teregam (Mal.)

N.B.—The plant known as Aisar at Matheran is *Callicarpa Cana*, Linn., (K.R.K.)

Habitat :—Western and Southern India and the Circars.

A small or moderate-sized bushy tree, 30-40ft. Branchlets stout, cylindric, closely covered with a thick felt (easily detached) of stellate hair, young parts very densely stellate-tomentose. Leaves large 6-9in., ovate, rounded or obtuse at the base, slightly acuminate, acute, entire, glabrous when mature, rugose and bright green above, densely covered with a close felt of white or yellowish stellate hair beneath. Petiole $\frac{3}{4}$ -2in., stout, very tomentose. Flowers pale pinkish, lilac, sessile, in clusters of 3. Cymes shortly pedunculate, divaricately branched, densely stellate-tomentose. Bracts linear. Calyx membranous, stellate-tomentose. Corolla glabrous, tube $\frac{1}{8}$ in., lobes oblong, obtuse, recurved. Anthers cream-coloured. Drupe under $\frac{1}{4}$ in., globose, black, shining.

Uses :—Both leaves and bark are faintly aromatic and bitterish, and afford much mucilage when boiled. The leaves boiled in milk are used as a wash for aphthae of the mouth, and that the bark and root boiled in water yield a decoction which is used to lessen febrile heat and remove hepatic obstruction and hepatic eruptions (Rheede). Ainslie says that "this plant is reckoned by the Javanese amongst their emollients. The bark possesses a peculiar sub-aromatic and slightly bitterish taste and may probably be found to have other medicinal virtues. The Malays consider the plant as a diuretic." According to Drury, the root is employed in Upper India in cutaneous affections. In Ceylon the leaves and bark are used both internally and externally. The bark is said also to be chewed (Trimen).

949. *C. macrophylla*, Vahl., H.F.B.I., IV. 568.

Syn. :—*C. incana*, Roxb. 131.

Vern. :—Pattharman, sūmāli, denthar, daya (Himalayan names); Mathara, mattranja (Beng.); Bá-pattra, bauna (Pb.).

Habitat :—Throughout N. and E. India, ascending to 6,000ft.

in the W. Himalaya; from Kashmir to Assam; abundant in Bengal plains, (?) Deccan Peninsula.

An erect shrub, 4-8 ft. high, with straggling branches. Branches, leafstalks and inflorescence densely clothed. Bark thin, grey brown. Wood white soft (Gambles), with tawny wool-like to mentum. Leaves shortly stalked, 6-10 in. long, by 2-3 in. broad, lanceolate crenate or sharply toothed, long-pointed; at times ovate or ovate-lanceolate. Upper surface wrinkled, stellately-pubescent; lower, tomentose; lateral nerves 12-15 pairs. Petiole $\frac{1}{2}$ - $\frac{1}{3}$ in. Flowers hardly $\frac{1}{2}$ in. long, pink, crowded in axillary stalked cymes. Calyx bell-shaped, minutely 4-toothed, $\frac{1}{10}$ in. Corolla tubular regular 4-lobed, tube short. Stamens far protruding, equal, 4. Anthers small exserted. Ovary 2 or 4-celled; style long, stigma minutely capitate. Fruit a spongy succulent globose drupe, white with 4 one-celled pyrenes, when ripe fully (Collett and Kanjilal.)

Uses:—In Hazara the leaves heated are applied to rheumatic joints. (Stewart.) "The leaves," says Trimen, "have a peculiar scent, mixed fetid and lemon-like, and are used for flavouring native soups and curries. An aromatic oil is also obtained from the root and used as a remedy in disorders of the stomach."

950. *Tectona grandis*, Linn., f. H.F.B.I., IV. 570; Roxb. 202.

Sans.:—Sâka.

Vern:—Sagun (Hind.); Segun (Beng.); Singuru (Uriya); Tekku, tek (Tam.); Teku (Tel.); Jati (Mal.); Saj, sal (Arab. and Pers.); Sâgwân or Sâg (Bomb.); Tegina-mara, Sâguvâni, Sagoni-Mara (Kan.).

Habitat:—W. Deccan Peninsula, from Central India to Orissa.

A large deciduous tree, 80-120 ft. high; branchlets 4-angular, stellately tomentose. Leaves about 12 in. long (or much larger in seedling specimens), elliptic or obovate, acute or acuminate, entire, usually cuneate at the base; upper surface rough, but glabrous, the lower densely clothed with grey or yellowish tomentum, main lateral nerves 8-10 pairs. Flowers

many, on short pedicels and arranged in large terminal much-branched tomentose cymose panicles 1-3 ft. long; bracts at the forks lanceolate, those beneath the calyx narrower. *Calyx* (in flower) $\frac{1}{8}$ in. long, broadly campanulate, stellately tomentose; lobes $\frac{1}{10}$ in. long, subequal, spreading; the whole calyx ultimately enlarging to 1 in. or more and forming a membranous bladder-like covering to the fruit. *Corolla* white, glabrous, limb $\frac{1}{4}$ in. across; lobes subequal, seading. *Fruit* subglobose, $\frac{1}{2}$ in. in diam., somewhat 4-lobed; pericarp soft, densely clothed with felted stellate hairs.

Uses :—A plaster of the powdered wood is recommended in hot headaches and for the dispersion of inflammatory swellings; when taken internally it is said to be beneficial in dyspepsia, with burning of stomach. It also acts as a vermifuge. The ashes of the wood are applied to swollen eyelids and are said to strengthen the sight. The bark is an astringent, and the oil of the nuts promotes the growth of hair and removes itchiness of the skin. The flowers, according to Endlicher, are diuretic, and Gibson states that the seeds possess similar properties (Dymock).

The wood rubbed down with water into a paste allays the pain and inflammation caused by handling the Burmese black varnish *Thitsi* (*Melanorrhœa usitatissima*). It also deserves to be tried as a local application to inflammations arising from the action of the Marking Nut (Ph. Ind.). The oil is extracted from the wood in Burma, and is used medicinally as a substitute for linseed oil and as varnish (Mukerji.) The tar is used in the Konkan as an application to prevent maggots breeding in sores on draught cattle (Dymock).

At a meeting of the Nilgiri Natural History Society in 1887, Mr. Lawson showed a specimen of a whitish mineral substance found in a teak tree growing in the Government Plantation at Nilambur. This peculiar secretion is not altogether unknown to officers in the Forest Department, and its composition has on more than one occasion been investigated by chemists.

The late R. Romanis (Jn. Chem. Soc., 3-11-87) found that alcohol extracts a soft resin from teak wood, but no oil or varnish. On distilling the resin he obtained a crystalline substance which he also found to be present in considerable quantity in the tar resulting from the destructive distillation of teak. The analyses which he has made of the crystals point to the empirical formula $C_9H_{10}O$; on oxidation with nitric acid they yield what appears to be a quinone of the formula $C_{18}H_{14}O_2$.

951. *Premna integrifolia*, Linn., H.F.B.I., IV. 574.

Syn. :—*P. spinosa*, Roxb.

Sans. :—Ganikáriká, Agnímanthâ (produces fire by friction); Matha (churner); Ketú (fallingstar); Araní (stinginess); Vaijayantíka (flag-bearer).

Vern. :—Agetha, arní (Hind.); Ganiari, bhut-birarvi (Beng.); Gineri (Nepal); Ganniari (Oudh); Bakarcha (Garhwal); Eru-maimullai; Munnay (Tam.); Ghebu-nelli, pinua-nelli (Tel.); Châmâri (Mar.); Appel (Mal.) Narvel Bom.); Arni Guz); Aguyábát (Uriya).

N.B.—*Premna scandens*, Roxb., is *Châmâri*. It is called *chavâri-vel* at Matheran, *vel* or “yel” popularly for *vel*, i.e., a creeper, whereas *Pr. integrifolia*, Linn. is a shrub or a small tree (K.R.K.).

Habitat :—India, near the sea, from Bombay to Malacca; Sylhet.

A small evergreen tree or shrub with thorny stems and branches. Bark thin pale yellow lenticillate. Wood light creamy brown, moderately hard, even-grained, pleasantly scented. Young parts glabrate or very slightly pubescent. Leaves 2-3 in., broadly-oval, acute or rounded at base, acute or subacute, entirely or faintly crenate-serrate in upper part, always quite glabrous. Flowers on short pubescent pedicels, pale yellowish green. Cymes corymbosely paniculate, dense, pubescent, terminal. Calyx shallow 2-lipped, one lip entire, the other 2 lobed (so that the calyx appears 3-lobed), segments obtuse. Corolla-lobes rounded, lower ones somewhat longest; stamens slightly exerted. Drupe $\frac{1}{2}$ in. globose.

Uses :—Sanskrit writers describe the root as bitter, stomachic and useful in fever, anasarca, urticaria, &c. A soup made of the leaves is occasionally used as a stomachic and carminative. The root forms an ingredient of *dasamula*, a preparation often prescribed by the native physicians in obstinate fevers (Hindu Mat. Med.). Rheede notices a decoction of the leaves for flatulence.

The root is given in decoction as a cordial and tonic. The leaves rubbed along with pepper are administered in colds and fevers. The whole plant is used in the form of decoction in rheumatism and neuralgia (Atkinson).

Chemical composition.—The root-bark of this plant afforded a yellowish-brown powder giving an orange-brown tincture with alcohol. The tincture when evaporated left a reddish coloured tasteless resin and some extractive matter. The resin was soluble in ether and in alkaline liquors; from the latter solution it was precipitated in greyish-brown flocks by acids. Warmed with soda, the resin evolved an odour of lemon similar to that of Kamala resin; heated with sulphuric acid a transient purple colour was developed and a fragrant odour evolved. It showed no disposition to crystallize. The watery solution of the alcoholic extract had a sweetish taste in small quantities and was nauseous in larger quantities. It contained a bitterish amorphous alkaloid, a substance reducing Fehling's solution, and an astringent body, striking a green colour with ferric chloride, but giving no precipitates with gelatine. The alkaloid gave no distinct colour reactions with the strong mineral acids.

952. *P. tomentosa*, Willd., H.F.B.I., IV. 576.

Vern.:—Naguru-Chettu (Tel.); Pedanganeree, Kollay-Cotlay wellag (Tam.).

Habitat:—Deccan peninsula and Ceylon, frequent; from the Circars and Central Provinces southward.

A tree, often 50ft.; branchlets densely stellate-woolly. Leaves 6 by $3\frac{1}{2}$ in., base rounded or subcordate, coriaceous, minutely glandular scabrous above, nerves 7 pair; petiole 1 in. Corymbs $\frac{3}{4}$ in. diam., often sessile, upper branches (or nearly all) alternate; bracts $\frac{1}{2}$ in., linear. Calyx $\frac{1}{4}$ in., stellately woolly. Corolla $\frac{1}{8}$ - $\frac{1}{6}$ in., 2 lipped, hairy in the throat, greenish-yellow. Drupe $\frac{1}{2}$ in. diam., deciduously hairy, ovoid, 3-1-seeded.

An aromatic oil is obtained from the root, and used as a remedy in disorders of the stomach (Trimen).

953. *P. latifolia*, Roxb.

Var.—*Mucronata* Roxb., H.F.B.I. IV., 578; Roxb. 485.

Vern.:—Bakar, bakarcha, basóta agniú (Hind.); Agniú (Kumaun); Ban, khar, gián (Pb.).

Habitat:—N. India, from Kumaon to Bhotan and the Khasia Hills, also common in Bengal Plains.

Uses:—Dr. P. S. Mootooswamy states that the leaves are diuretic, and are given internally and applied externally in dropsy. An infusion of 10 drachms of the leaves and 2 drachms of coriander in ten ounces of boiling water has been used by him with advantage in acute dropsy.

Dr. Mootooswamy has seen the natives using the leaves soaked in goat's urine or in onion juice for dropsy ; sometimes chebulic myrobalans are added if the bowels are costive.

A small or medium-sized deciduous tree ; branchlets and young leaves pubescent or velvety. *Leaves* membranous, drying black, 3-6in. long broadly ovate, sharply acuminate, usually quite entire, base cuneate ; upper surface glabrous when mature, the lower hairy especially on the midrib, petioles $\frac{1}{2}$ - $\frac{3}{4}$ in. long. *Corymbs* broad, usually terminating short leafy branchlets, rusty pubescent. *Calyx* 5-toothed, clothed with spreading hairs. *Corolla* greenish-white, $\frac{1}{2}$ in. long, pubescent within. *Drupe* globose, verrucose.

Use :—The milk of the bark is applied to boils, and the juice is given to cattle in colic (Atkinson). The juice is applied medicinally in the Punjab (Stewart).

954. *P. esculenta*, Roxb., H.F.B.I. IV., 580 ; Roxb. 485.

Habitat :—Assam and Chittagong. A cultivated plant.

A short-stemmed entirely glabrous shrub ; branching, 6-8ft. Leaves $6\frac{1}{2}$ by 3in., obovate or elliptic-acuminate, sharply serrate, base entire, cuneate suddenly narrowed, sometimes very shortly cordate, mature glabrate, nerves 5 pair ; petiole $\frac{1}{4}$ in., slender obscurely puberulous. *Corymbs* compact, nearly glabrous, $2\frac{1}{2}$ in. diam., short-peduncled, globose many-fid ; bracts $\frac{1}{8}$ in., linear. *Calyx* $\frac{1}{8}$ in., cup-shaped, obscurely puberulous ; minutely 5-toothed somewhat enlarged, more distinctly toothed in fruit. *Corolla* $\frac{1}{8}$ in., yellowish white, 2-tipped, throat hairy. *Drupe* $\frac{1}{8}$ in., globose or somewhat obovoid, usually 3-4 seeded.

Use :—The natives of Chittagong employ the leaves medicinally (Roxb.).

955. *P. herbacea*, Roxb. H.F.B.I., IV. 581 ; Roxb. 485.

Habitat :—Subtropical Himalaya, from Kumaon to Bhotan. S. Deccan Peninsula.

Sans. :—Bhumijambu, bhumi-jamberka.

Vern.:—Bhuijām (B.); Kada met (Santal.); Nāla niredu (Tel.), Gantu Bhārangi (Madras).

A small inconspicuous undershrub, produced unusually from woody rootstocks after the jungle fires. Stem hardly any. Leaves simple sessile, 4 by 2-3in., cuneate or obovate, serrate pubescent, mature pubescent on the nerves which are in 5 pair. Corymbs 1½in. diam., pubescent, somewhat dense; peduncles 0-1½in. Flowers greenish white, 4-lobed. Calyx 1/10in. closely pubescent, lobes ovate obtuse, sub-segmently 5-toothed. Corolla ½in., hairy in the throat, 4-lobed, obscurely two-lipped. Drupe ¼in. diam., globose, black when ripe, with one pyrene. Roots about as thick as a crowquill with numerous almost globular woody knots. "A good example of a plant belonging to a genus mostly represented by trees or shrubs, and which has become permanently dwarfed by continuous exposure to periodical fires" (Duthie).

Use:—A preparation of the root is given internally for rheumatism by the Santals (Revd. A Campbell).

This plant is frequently confounded with *Clerodendron serratum*, Spreng., the roots and stems of which are sold under the name of Bharangi. In Sanskrit, Bharangi bears the names of Bhargi, Brahmayashtika, Hangika, Bringa-ja and Vardhaka, and is described in the Nighantas as hot, bitter, pungent, and digestive; a remover of dropsy, cough, phlegm, asthma, fever, and rheumatism. The juice of the root is given with the juice of ginger and warm water in asthma, and it enters into the composition of several compound decoctions for diseases of the lungs. A confection called Bhargi-guda is prepared with a decoction of the root, and the ten drugs called Dasamula, chebulic myrobals, treacle, and aromatics. An oil prepared with the root is recommended for external application in the marasmus of children (Chakradatta).

The properties of *P. herbacea* agree much more nearly with those attributed to Bharangi in the Nighantas, than do those of *Clerodendron serratum*, although the latter plant is at the present time in use as Bharangi throughout the greater part of India. Dutt attributes the drug to *C. Siphonanthus*, but the samples we obtained from Bengal consisted of the stems of *C. serratum*. Bombay was formerly supplied from the Circars with *P. herbacea*, but now uses *C. serratum*.

Chemical composition.—The constituents of this root resemble to a great extent those found in *P. integrifolia*. An orange-brown acid resin soluble in ether, alcohol and alkaline solutions, and traces of an alkaloid are the most important. There is a quantity of starch in the root, and an entire absence of astrigeny (Pharmacographia Indica II, pp. 68-70).

956. *Gmelina arborea*, Linn., H.F.B.I., IV. 581 ; Roxb. 486.

Sans. :—Kásmari (growing in Káshmere), Sarvato-Bhadra (auspicious in every quarter), Shri-parni (fortune-leaved), Krishna-vrintaka (black stalk), Kambari (of variegated color), Hira (a plant).

Vern. :—Kúmhār gúmhār, kákódúmbari (Hind. and Pb.) ; Gúmār, gúmbār (Beng.) ; Gambari (Nepal) ; Gomari (Ass.) ; Numbor (Lepcha) ; Bolkobak (Garó) ; Gumadi, cummi (Tam.) ; Gúmar-tek, pedda-gomru, tagumúda (Tel.) ; Shewney, kuli (Kan.) ; Kurse (Gond.) ; At-demmata (Cingh.) Shewan, Shivan (Mar.).

Habitat.—Throughout the Dekkan and Konkan, C. P., Berar, North West Himalaya, Ceylon, Chittagong, Eastern Bengal.

An unarmed deciduous tree, up to 60ft. high ; bark somewhat corky, greyish outside and yellow within ; young parts covered with white mealy pubescence. *Leaves* 4-8in. long, broadly ovate, acuminate, entire ; upper surface glabrous when mature, lower persistently clothed with fulvous stellate hairs, base cordate or truncate and shortly cuncate ; petioles 2-3in. long, cylindric, puberulous, glandular at the top. *Flowers* in small usually 3-flowered cymes which are arranged along the branches of a densely fulvous-tomentose panicle, about 12in. in length ; buds clavate, angled ; bracts $\frac{1}{2}$ in. long, linear lanceolate. *Calyx* broadly campanulate, $\frac{1}{2}$ in. long, densely fulvous-tomentose ; teeth small, triangular, acute. *Corolla* 5-lobed, $1\frac{1}{2}$ in. long, brownish-yellow, very hairy outside ; upper lip $\frac{3}{8}$ - $\frac{1}{2}$ in. long, deeply divided into 2 oblong obtuse lobes lower lip about twice as long, 3-lobed, the middle lobe much longer than the lateral ones and with a crenulate margin. *Drupe* $\frac{3}{4}$ -lin. long, ovoid or pyriform, smooth, orange-yellow when ripe.

Uses :—In Hindu medicine, the juice of the leaves is used to remove foetid discharges and worms from ulcers (Duti). The fruit is officinal in the Punjab. The root is bitter, tonic, stomachic and laxative ; given in cough, rheumatism, fever and indigestion, and is said to have anthelmintic properties (Watt).

In Bombay, the juice of the young leaves is used as a demulcent in gonorrhœa, cough, etc., either alone or combined with other drugs of similar properties (Dymock).

Chemical composition.—The root reduced to fine powder lost 8.39 per cent. at 100°C. The ash amounted to 14.41 per cent., and was free from any trace of manganese.

On analysis the following results were obtained:—

Petroleum ether extract...	1.80	per cent.
Ether	21	" "
Alcoholic	4.274	" "
Aqueous	19.560	" "

The petroleum ether extract consisted of a yellow viscid oil, with slight siccative properties. On standing, white grains separated, which were non-crystalline when examined microscopically. In alcohol the extract was partly soluble; no alkaloid was present. The ether extract was yellowish-white, and contained a trace of oil; it gave no reaction with ferric salts; in addition to resins a trace of benzoic acid was present.

The alcoholic extract was yellow and brittle; with water a turbid mixture was obtained, which had a bitter taste. In addition to resins, a trace of an alkaloidal principle was detected.

The aqueous extract was sweetish and slightly bitter, and easily reduced Fehling's solution on boiling.

The fruit contained butyric acid, with a trace of tartaric acid a trace of astringent matter giving a greenish coloration with ferric chloride, an alkaloid, and a white principle, non-crystalline, and neutral, with resin and saccharine matter.

The alkaloids present in the fruit and in the root appear to be identical. The amount present in each case was very small, not exceeding a trace. (Pharmacographia Indica III, 71-72).

957. *G. asiatica*, Linn., H.F.B.I., IV. 582; Roxb. 487.

Sans. :—Biddari.

Vern. :—Badhāra, Nāg-phul (Hind.); Gannudu, Chinta ganer Chelu (Tel.); Nalacomul (Tam.); Nilak-kumizh (Tam.); Challagummudu (Tel.); Nilak-kumazh (Mal.); Lāhān shivan (Mar.).

Habitat :—Deccan Peninsula and Bengal.

Flowers appear along with young foliage. 4 upper lobes dull orange-pink, lower one lemon-yellow.

A large straggling shrub, with bright yellow flowers sometimes climbing, branches frequently spinescent, at times unarmed. Bark brownish white thin. Wood hard grey. Leaves 1-1½ in., ovate or obovate, frequently lobed, pubescent when young; mature beneath, glabrous glaucescent from a coat of

minute round glands (C. B. Clarke). Petiole $\frac{1}{2}$ in. Racemes 1-2 in., bracts $\frac{1}{2}$ in. caducous. Calyx $\frac{1}{2}$ in., tomentose, but with large bare glands. Corolla $1\frac{1}{2}$ in., tomentose with glabrous glands. Drupe $\frac{3}{4}$ in., long ovoid or obovoid 1-2-seeded.

Use :—Used for rheumatism, pains in the loins, and syphilitic diseases. It was known to the Portuguese under the name *Rais Madre de Deas*. The root was in great request in Goa as an antidote to every poison, and a remedy for every disease in former days. The roots are slightly bitter, astringent, and aromatic (Dymock). It is regarded by the Hindu doctors as a demulcent and alterative. "The leaves and young shoots of this shrub abound with a thick, viscid mucilage, which is imparted readily to cold water, which, when thus impregnated, is employed by the natives in the treatment of gonorrhœa to allay ardour urinae" (Pharm. Ind.). At the present time the root is principally employed as a demulcent for gonorrhœa and catarrh of the bladder (Watt).

958. *Vitex trifolia*, Linn. f., H.F.B.I., IV. 583 ; Roxb. 481.

Sans. :—Sindhuvāra ; Sindhuka.

Vern. :—Nishinda (B.) ; Pani-ki-sanbhālu, sambhalus (H.) ; Nirnochi (Tam.) ; Vavilli (Tel.) ; Lingoora (Mar.) ; Pāni-ki-Sambhālū (Dec.) ; Nira-lakki-gida (Kan.).

Habitat :—Scattered throughout India, in the tropical and sub-tropical region, from the foot of the Himalaya to Ceylon, nowhere common.

A shrub or small tree. Shoots hairy or tomentose. Leaves, opposite, 3-often 1-foliate. Leaflets sessile, pleasantly aromatic 1-3 in., obovate or ovate oblong sub-obtuse entire, glabrate above ; beneath tomentum of matted, scarcely stellate hairs, so close as with difficulty to be scraped off. Petiole 1 in. Panicles terminal penultimate axillary, closely white tomentose ; 1-4 in. oblong, often leafy at the base ; bracts minute, peduncles often added. Calyx $\frac{1}{2}$ in. ; cup-shaped minutely 5-toothed. Corolla tomentose, lavender to blue, $\frac{1}{2}$ - $\frac{1}{2}$ in., small tubular. Stamens 4, didynamous. Filaments hairy at the base. Drupe $\frac{3}{4}$ in. diam., black.

Uses :—The leaves useful in special diseases and after parturition and also in cutaneous diseases, said to regulate the bile and increase the appetite, also applied externally in enlarged spleen, contusions, sprains and rheumatism (Mukerjee).

The powdered leaves have been given with success in cases of intermittent fevers, and the flowers are prescribed with honey in fevers accompanied with vomiting and severe thirst. Pillows stuffed with the leaves of this plant are used to cure catarrh and headache. The leaves are considered useful as an external application to all rheumatic pain, sprains, etc. Fruit employed in amenorrhœa, etc. (Agra Exhibition).

Bontius speaks of it as anodyne, diuretic and emmenagogue, and testifies to the value of fomentations and baths prepared with it in the treatment of "Beri-beri" and in the burning of the feet (*Ignipedites*) in natives (Ph. Ind.).

959. *V. negundo*, Linn., H.F.B.I., IV. 583; Roxb 482.

Sans. :—Nirgundi.

Vern. :—Sambhálú, nirgandi (Hind.); Nishinda (Beng.); (Venn.); Aslaq (Arab.); Sisban (Pers.); Shánbáli (Dec.); Noch-chi, chinduváram, (Tam.); Tellavávilli Sindhuváramu, (Tel.); Bill-nekki, Karlakki, lakki-gida (Kan); Kiyon-bhánbin (Burm.); Katri (Bom.); Lingoor (Mar.); Banna (Pb).

Habitat :—In the warmer zone, a universal plant throughout India. Thana district freely growing.

A small tree or shrub about 3ft. high, deciduous, strongly scented; branchlets, underside of leaves and inflorescence clothed with short grey or white pubescence. Bark thin grey. Wood greyish white, hard. Leaves 3-5-foliate (simple and more distinctly crenate on luxuriant young shoots) with a raised line across the stem at the base of the petioles. Leaflets lanceolate, 1-5in., by $\frac{1}{3}$ -1 $\frac{1}{3}$ in., the lowest pair smallest sessile or sub-sessile, the midpart, if present, more or less distinctly petiolulate, the odd leaflet largest and with a petiolule $\frac{1}{3}$ - $\frac{2}{3}$ in.,

long, entire or distinctly crenate above the middle, glabrescent above, grey pubescent beneath. Flowers small. Panicles upto 12in. long. Calyx $1\frac{1}{2}$ in., 5-toothed. Corolla very hairy in the throat $\frac{1}{2}$ in., middle lobe of the lower lip the largest. Stamens 4, didynamous, exserted. Ovary 2-4 celled, 4 ovuled; style filiform, shortly 2-lobed. Fruit a succulent drupe supported by the more or less accrescent calyx, $\frac{1}{2}$ in. diam., globose, black when ripe. Endocarp normally 4-celled (Kanjilal).

The branches are apt to be attacked by *Cuscuta reflexa* (Dodder), says Gamble.

Uses :—“ Sanskrit writers mention two varieties of Nirgundi—that with pale blue flowers is called Sindhuvára (*Vitex trifolia*), and that with blue flowers is called Nirgundi. The properties of both are identical, but the latter is generally used in medicine. The root of *V. Negundo* is considered tonic, febrifuge and expectorant. The leaves are aromatic, tonic and vermifuge. A decoction of Nirgundi leaves is given with the addition of long pepper in catarrhal fever with heaviness of head and dullness of hearing. A pillow stuffed with the leaves of Nirgundi is placed under the head for relief of headache. The juice of the leaves is said to have the property of removing foetid discharges and worms from ulcers. An oil prepared with the juice of the leaves is applied to sinuses and scrofulous sores” (Hindu Mat. Med.). Dr. Fleming remarks that the leaves are discutient, and are useful in dispersing swellings of joints from acute rheumatism and of the testes from suppressed gonorrhœa. The people of Mysore are in the habit of treating febrile, catarrhal and rheumatic affections by means of a vapour bath prepared with this plant. Roxburgh also mentions the use of the decoction of the leaves as a bath in the puerperal state of women in India, and Ainslie states that the Mahomedans smoke the dried leaves for the relief of headache and catarrh. The dried fruit acts as a vermifuge (Pharm. Ind.).

Dr. Hove (1787) states that the Europeans in Bombay call it the fomentation shrub, and that it is used in the hospitals

there as a foment in contractions of the limbs occasioned by the land winds. In the Concan, the juice of the leaves with that of Máká (*Eclipta alba*) and Tulasi (*Ocimum sanctum*) is extracted, and Ajwán seeds are bruised and steeped in it, and given in doses of six massas for rheumatism. The juice in half tolá doses with ghi and black pepper is also given, and in splenic enlargement 2 tolás of the juice with 2 tolás of cow's urine is given every morning (Dymock).

Chemical composition.—The leaves contain principally an essential oil and a resin. The oil possesses the odour of the drug and is neutral and almost colourless. The resin dissolves in alkaline solutions with a reddish-brown colour, softens below 40° C., and gives off aromatic vapours when heated. A tincture of the drug gives a green colour with ferric chloride. The ash of the air-dried leaves amounts to 7.75 per cent.

The fruits contain an acid resin, an astringent organic acid giving a green colour with ferric salts and a precipitate with gelatine, malic acid, traces of an alkaloid and colouring matter. The fruits previously dried at 100° gave 6.8 per cent. of ash (Pharmacog. Indica. III. 75).

960. *V. peduncularis*, Wall., *Var. Roxburghiana*, H.F.B.I., IV. 587; Roxb. 482.

Vern.:—Boruna; Goda (B); Osai (Ass.); Bhadu, marak, (Santal); Karwru (Magh.); Hila-anwal (Cachar); Shelangri, (Garo); Navaládi (Kan.).

Habitat:—Behar, at Parasnath, E. Bengal and Khasia Terai.

A middle-sized or large deciduous tree, 20-40 ft. Bark thick. Wood purplish or reddish grey, hard, close-grained youngest shoots minutely grey pubescent, branchlets, petioles, and leaves glabrous. Leaves 3 foliate. Leaflets $4\frac{1}{2}$ by lin., acuminate, lanceolate; mature glabrate above, densely covered by minute shining yellow resinous glands beneath, midrib sometimes puberulous; petiolule of the middle leaflet $\frac{1}{4}$ - $\frac{1}{3}$ in. Petiole 2-4 in., slender or sometimes slightly winged. Peduncles 3-4 in., from the penultimate axils. Panicles often 6-8 by 2 in., open. Bracts $\frac{1}{2}$ in. linear. Calyx $\frac{1}{6}$ in, grey-pubescent sub-truncate, Corolla, $\frac{1}{2}$ in., grey-pubescent lower lip longer than the tube. Drupe $\frac{1}{2}$ in. diam., cuboid globose. There are

shining resinous glands on the corolla; and calyx also. Flower yellowish or greenish white.

Use:—In Chutia Nagpur, the bark is used for making an external application for pains in the chest (Revd. A. Campbell).

961. *V. glabrata*, Br. H.F.B.I., IV. 588.

Vern.:—Goda, horina, ashwal (Beng.); Luki neva-ledi (Tel.); Sengenit karril (Kan.); Tokra (Magh.); Sherasa (Mar.); Htoulksha (Burm.); Sheras; Longarbisthiras (Bom.).

Habitat:—From S. Assam and Cachar to Deccan Peninsula.

A large deciduous tree; wood grey, handsome, with a satiny lustre, moderately hard, close-grained, durable. Youngest shoots slightly fulvous-tomentose or woolly. Leaves almost glabrous, mostly 5-3 foliate. Leaflets 5 by 2½ in., ovate or oblong, subentire, acute or cuneate at both ends, entire, rarely toothed, mature with scattered appressed minute hairs beneath, younger very softly hairy or subtomentose. Petiolules ¼-¾ in., upperside without resinous glands. Petiole 1-4 in., not winged. Peduncles long or often short. Cymes dichotomous. Flowers somewhat numerous, mostly shortly pedicelled; bracts inconspicuous. Calyx 1½ in., minutely toothed, usually glabrous in the lower, hairy in the upper part. Corolla ½-¾ in. long, white and purple, tomentose, "ochroleucous," says C. B. Clarke, which means yellowish white or buff; further Mr. Clarke adds thus:—"Lowest segments much the largest, hairy blue-purple." Filaments minutely hairy. Pistil glabrous. Drupe ½-¾ in. long, succulent, obovoid.

Use:—The bark and root are used as astringents.

962. *Clerodendron inerme*, Gaertn., H.F.B.I., IV. 589; Roxb. 477.

Sans.:—Kshudrâgnimantha, kundali.

Vern.:—Sang-kuppi, sang-kúpi, lán-jai (H.); Bun-jumat, bun-join, bonjoi, bán-jai, ban-juen, batraj (B.); Vanajâi (Bom.) and Mar.); Isandhâri, sangkupi (Duk.); Shengan-kuppi, pina-shengam-kuppi, shangam-kupi, pinari (Tam.); Pishinika, uti

chettu, písangi, pisingha, tak-kolapu-chettu, nalla-kupi, erupichecha eti-pisi-nika, peunika, eru puchcha (Tel.). Vishama-dhâri, Kuṇḍali (Kan); Nirvochchi (Mal).

Habitat:—India and Ceylon, near the sea, from Bombay to Tenasserim.

A straggling almost scandent evergreen shrub, 3-7ft. Young shoots minutely grey-pubescent. Leaves opposite, rarely ternate, dark green, $\frac{3}{4}$ -1 $\frac{1}{2}$ in. entire elliptic or ovate, nearly coriaceous, base cuneate young somewhat gray pubescent. Petiole $\frac{1}{8}$ - $\frac{1}{4}$ in. long. Flowers showy white, in axillary pedunculate 3-9-fid. cymes. Bracts $\frac{1}{30}$ in. linear, pedicels $\frac{1}{3}$ - $\frac{1}{2}$ in. Calyx grey puberulous or glabrate. Corolla tube $\frac{3}{4}$ in. long, $\frac{1}{3}$ in. broad, pear-shaped, spongy hardly succulent, smooth hardly sulcate. Separating into 4 long woody pyrenes.

Uses:—Ainslie says the juice of the leaves and root is considered alterative in scrofulous and venereal affections, the dose being a tablespoonful with or without a little castor oil. Rheede speaks of the use of the dried leaves for the same purpose, and of a poultice, of the leaves to resolve buboes; he also says a bath prepared with them is used in mania, while the root boiled in oil affords a liniment useful in rheumatism. The Malays and Macassars administer the berries or the root to people poisoned by eating unwholesome fish; the leaves smeared with oil are heated over the fire and applied to recent wounds; they are also one of the leaves used for preparing the green rice of the Malays. In Bombay the plant has a great reputation as a febrifuge; the juice of the leaves is used in doses of half an ounce. It is mucilaginous, very bitter, somewhat saline, and with a fragrant, apple-like odour.

The medicinal properties of *C. inerme* closely resemble those of *Chiretta*. The dried leaves have been found to be quite as efficient as the juice of the fresh plant; they should be dried in the shade to preserve their aroma, and may be administered in decoction with aromatics, or powdered and made into pills. A tincture has also been found to be an efficient preparation.—(Dymock).

Chemical composition.—A proximate analysis of the leaves gave the following results :—

Etherial extract	...	...	...	4.77
Alcoholic "	...	...	...	5.70
Aqueous "	...	...	...	15.54
Alkaline "	...	...	...	11.41
Organic residue	...	...	...	50.06
Inorganic "	...	...	...	6.44
Moisture "	...	...	...	6.01
Total				100.00
Ash soluble in water	...	...	...	44.14
" " in acid	...	...	...	47.10
Sand and silicates	...	...	...	8.75
Total				100.00
Sodium chloride in ash	...	...	...	24.01

The bitter principle is entirely removed by ether, and the subsequent treatment by alcohol and water affords extracts which are free from any bitterness.

The dual nature of the bitter principle seems to show a very remarkable resemblance with that found in Chiretta (*Swertia Chirata*), a gentianaceous plant.

The leaves, when distilled with water, yield a stearopten-like body having the fruity flavour of the fresh plant. The ether extract was fragrant, green, and of a greasy consistence. The alcoholic extract contained some resinous matter, and much of the salt, which was left as cubical crystals when evaporated. Water dissolved out gum and brown colouring matter. Neither tannin nor starch was present in the leaves. They left on gentle incineration as much as 15.29 per cent. of ash, and the large amount of salt in this ash indicates the habitat of the plant as being in close proximity to the sea. (Hooper, in Pharm. Record, Aug. 1st, 1888).

963. *C. phlomoides*, Linn., H.F.B.I., IV. 590; Roxb. 477.

Sans. :—Vāta-ghni.

Vern. :—Urin, pīrun (H.); Panjot (Santal); Gharayt (Sind.); Irun, arni (Guz.); Airan (Bom.); Airanmula (Mar.); Talūdālel, taludala, vatamadakki (Tam.); Telaki, nellie, tekkali, teleki, tilaka (Tel.).

Habitat :—From the N.-W. Himalaya Terai to Ceylon, general in the drier climates, extending to Behar and Orissa (not to Bengal). Ratnagiri and Thana Districts (K.R.K.).

A small tree, up to 30ft. high, or large pubescent semiscandent shrub. Bark light brown thin smooth. Wood grey hardclose-grained. Branches cinereous. Leaves small $1\frac{1}{2}$ - $2\frac{1}{2}$ in. long, ovate or rhomboid more or less sinuate-crenate, often broader than long, truncate subcordate at base, often apiculate, undulate, rather thick puberulous beneath. Petiole $\frac{1}{2}$ -1in. pubescent. Flowers white or pink, fragrant, moderate-sized on slender pubescent pedicels; cymes small, axillary, dichotomous combined to form a rounded terminal panicle. Bracts small leafy, oblong, obtuse, mucronate. Calyx large, over $\frac{3}{8}$ in., segment cut fully half way, ovate acuminate, glabrous, veiny. Corolla-tube 1in., slightly pubescent outside, lobes $\frac{1}{3}$ in., very nearly equal, oval or elliptic-obtuse. Drupe, not seen, says Trimen Dry, $\frac{1}{3}$ - $\frac{1}{2}$ in. long separating in 4 pyrenes, says Brandis, slightly succulent, says C. B. Clarke.

N. B.—The specific name is given by Trimen as *C. Phlomides*, Linn f. He says it is incorrectly given as *C. Phlomoides* (K.R.K.).

Mr. H. H. Haines, I. F. S. gives *Safed tekra* as its Marathi name, and mentions a variety of it as *Var.* Donaldi, and gives *Kala tekra*, as its Marathi name. He says the 'Safed tekra' is used in native medicine, but not the 'Kala tekra,' which is distinguished by the following characteristics:—Leaves attaining 3·25'' (while those of 'safed tekra' only reach 1·75''), glabrous, membranous, with a cuneate base (type pubescent on both sides). Calyx ·25'' in flower and enlarged calyx as long as lobes of fruit only, which is 3'' long (in 'safed tekra' the sepals are acuminate and are at least ·12'' longer than the fruit), glabrous, deltoid apiculate. Corolla ·75'' long (The Indian Forester, Aug., 1914, p. 402).

Uses:—In Bombay, the root is used as a bitter tonic, and is given in the convalescence of measles (S. Arjun). In Southern India, the juice of the leaves is given in neglected syphilitic complaints in doses of half an ounce or more twice daily (Ainslie). The Santals rub the plant over their bodies in dropsy and give it to their cattle to cure them of diarrhoea and worms or when the stomach swells (Campbell).

964. *C. serratum*, Spreng. H.F.B.I., IV. 592.

Syn.:—*Volkameria serrata*, Linn. Roxb 479.

Sans.:—Barbara

Vern.:—Barangi (H.); Ban-bakri (Jaunsar); Chúa (Nepal); Yi (Lepcha); Chirudekku (Tam.); Brahmarimari (Tel.); Bharang, bharangi or Bhángará (Bomb.); Bháránga-mula, mula-root (Mar.); Bharungi Guz.).

Habitat :—From the Himalaya, east of the Sutlej to Ceylon ; frequent ; very common in Bengal, also in Thana and Ratnagiri Districts.

A handsome shrub. Stem 4-8 ft. slightly branched, quadrangular. Bark yellow. Rootstock woody thick, perennial annually shooting up fresh herbaceous stems. Youngest shoots and inflorescence pubescent, (Brandis) Young parts glabrous, says Trimen from Ceylon. Leaves large 4-8 in., passing bracts above, oval ovate-oval acute at both ends, very coarsely and sharply serrate, glabrous, petiole very short stout. Flowers large on short stout compressed, pubescent, deflexed pedicels. Cymes numerous, lax, pubescent, dichotomous, with a pair of acute bracts at each branching and a flower in the fork, each in axil of a large leafy bract, and collectively forming a long, lax, terminal erect panicle 6-10 in. long. Calyx $\frac{1}{2}$ in. long, cup-shaped, puberulous, segments very short broadly triangular, ciliolate. Corolla-tube short, $\frac{1}{4}$ - $\frac{3}{8}$ in., somewhat inflated, oblique at mouth, upper and lateral lobes $\frac{1}{2}$ in., broadly oval, flat, spreading, lowest one (lip) $\frac{3}{4}$ in. long, very concave deflexed ; filaments much curved, hairy at base. Fruit a drupe about $\frac{1}{2}$ in. long, depressed, somewhat succulent, normally 4-lobed, with a pyrene in each lobe (1-3 often suppressed). The leaves have a faint scent. Corolla with posterior and lateral lobes pale-blue, anterior one dark bluish-purplish (Trimen). Fruit purple black (C. B. Clarke). Flowers bluish white, fruit black (Kanjilal).

Uses :—The root is used by natives in febrile and catarrhal affections (Ph. Ind.). It is said to be good in malarial fevers by the people of Ratnagiri where the tender leaves are eaten also as vegetable by the power classes of Hindus (K.R. Kirtikar).

Leaves boiled with oil and butter made into an ointment useful in cephalalgia and ophthalmia. The seeds bruised and boiled in butter milk used as aperient and in dropsy (Drury).

The authors of the *Pharmacographia Indica* write :—

“ From enquiries we have made there is no doubt that this plant is largely used in many parts of India as a substitute for *Premna herbacea*, the true Gantu Bhāraṅgi, but if we regard the root of *C. serratum* as the true Bhāraṅgi, and the root of *P. herbacea* as the Gantu (or knotted Bhāraṅgi),

there will be no confusion. *C. serratum* has a light-coloured root, very often contorted, and seldom more than an inch in diameter. A light brown epidermis and thin bark cover the tough woody portion, which shows well-marked medullary rays and concentric rings. The drug contains much starch, it is faintly bitter, and has no peculiar odour. The young tops and light blue flowers are used as a vegetable by the natives.

The root of *C. serratum* did not yield anything of great activity when examined chemically, which proves that there is little to recommend it as a medical agent."

965. *C. infortunatum*, Gaertn., H.F.B.I., IV. 594.

Syn.:—*Volkameria infortunata*, Roxb. 478.

Vern.:—Bhant, bhat (Hind.); Chitu (Nepal); Kadung (Lepcha); Lukunah (Mehi); Khaoung-gyee (Burm.); Pera-goo (Mal.); Barangi (Punj.); Bakada (Tel.); Karu (Dehra Dun).

Habitat:—Very common in the warm region throughout India, from Gurhwal and Assam to Ceylon.

A shrub or small slender tree often gregarious 4-10ft. branchlets bluntly quadrangular, yellowish or white villous silky pubescent upwards. Petioles, underside of leaves inflorescence slightly pubescent. Leaves large, 4-6in., ovate, cordate or rounded at base, acuminate, acute or sub-acute, entire, thinly hairy on both sides, especially on the veins beneath, somewhat 3-nerved from base, venation prominent beneath. Petiole $1\frac{1}{2}$ -3in., cylindric, pubescent. Flowers large, white pink-tinged, on rather long pedicels, cymes stalked, in large lax, pyramidal pubescent panicles. Bracts leafy, deciduous. Calyx $\frac{1}{2}$ in., silky pubescent, very much enlarged in fruit, segments deep, lanceolate, very acute. Corolla-tube about 1in., slender, lobes, large, $\frac{1}{2}$ in., oblong, obtuse. Drupe $\frac{1}{2}$ in. nearly globose, succulent, purplish black, shining, seated in centre of the very much enlarged, spreading, succulent bright pink Calyx, $1\frac{1}{2}$ in. diam., pyrene usually solitary brittle (Trimen).

Uses:—"Dr. Bholanauth Bose calls attention to the leaves as a cheap and efficient substitute for *chiretta* as a tonic and antiperiodic. The fresh juice of the leaves is stated by Mr. Kanny Lall Dey to be employed by the natives as a vermifuge, and also as a bitter tonic and febrifuge in malarious fevers, especially in those of children" (Ph. Ind.). The leaves and

root are employed externally for tumors and certain skin diseases (Ph. J. July 25, 1885, p. 87). The bark is also employed by Indian and Arabian physicians (Balfour). "The expressed juice is an excellent laxative, cholagogue and anthelmintic. It is used as an injection into the rectum in cases of ascarides. It is also a valuable bitter tonic, and the natives believe that its presence cures scabies in the locality" (Dr. Thornton, in Watt's Dictionary).

Chemical composition.—Approximate analysis of the leaves gave the following result:—

Ethereal extract	...	...	10.81
Alcoholic "	...	...	16.40
Aqueous "	...	...	15.20
Alkaline "	...	...	8.97
Organic residue	...	...	38.47
Inorganic "	...	...	5.93
Moisture	...	...	4.22
Total			100.00
Ash soluble in water	...	...	16.83
" " in acid	...	...	72.86
Sand and silicates	...	...	10.30
Total			100.00
Sodium chloride in ash	...	...	5.58

The leaves of *C. infortunatum* yielded no volatile constituent when boiled with water. The ether extract contained a quantity of resinous matter, and gave up the bitter principles when heated with water; the extract was of a less fatty consistence than that from the *C. inerme* leaves. The spirituous extract was also much larger than in the previous sample, and was differently constituted, inasmuch as it almost entirely consisted of a tannin, giving a green colour with ferric chloride. These leaves contain much more soluble organic matter than the former, but the percentage composition of the ash shows that the soluble inorganic salts are much smaller. The ash of these leaves amounted to 12.3 per cent (Hooper, in Pharm. Record, Aug. 1st, 1888).

966. *C. siphonanthus*, Br., H.F.B.I., IV. 595.

Syn. :—*Siphonanthus indica*, Willd. Roxb. 481.

Sans. :—Brahma yastika.

Vern. :—Barangi; Arnah and Arni (H.); Bamanhati (B.); Arni, dawā-i-mubarak, arnah (Pb.); Bhārangi (Bomb.); Sarum enter (Dec.).

Habitat :—From Sikkim and Assam to Tenasserim frequent, Mts. of S. Deccan Peninsula ; Kumaon, wild.

A glabrous shrub 4-8ft., branches virgate. Stems herbaceous, fluted, hollow. Leaves in whorls of 3-5, 6-9 by 1-1½ in., narrow lanceolate, subentire glabrous, rather hard, base tapering. Petiole 0-½ in. Flowers white, fading into yellow, in rigid terminal panicles, 9-18 in. long. Pedicels ½-1½ in. Calyx ½ in. long, divided ¾ way down dark red and enlarged in fruit. Segments oblong, acute. Corolla-tube 3-4 by 1 in., drooping ; lobes ½-⅔ in., oblong-ovate. Corolla glabrous, white. Drupe ovoid, dark-blue, about ½ in. long, supported by the spreading red Calyx.

Uses :—"The root considered useful in asthma, cough and scrofulous affections" (Dutt). The wood is slightly bitter and astringent and the resin employed in syphilitic rheumatism (Baden-Powell). The expressed juice of the leaves and tender branches is used with *ghî*, as an application in herpetic eruptions and pemphigus. The branches cut into small pieces and threaded like heads, are put on the necks of children suffering from these diseases as a charm, and it is believed by the natives that the smell of this plant is sufficient to cure these diseases (Dr. Thornton, in Watt's Dictionary).

967. *Avicennia officinalis*, Linn., H.F.B.I., IV.
604.

Syn. :—*A. tomentosa*, Facy. Roxb. 487.

Vern. :—Bina (B. and H.) ; Timmer, cheria (Sind) ; Tivar (M.) ; Nalla-mada, Mada-chettu (Tel.) ; Upputti (Mal.)

Habitat :—Common in the mangrove swamps of the Deccan Peninsula. Also in the swamps near Bombay and Kurla. (K.R.K.)

A large evergreen shrub or tree attaining 20ft., and a great girth, found in salt marshes, coast and tidal forests of India, Ceylon, Burma, the Andaman and Nicobar Islands and Sundarbans, often gregarious. "This tree, like other mangroves," says Gamble, "has the property of sending out very numerous

leafless blind root suckers which are believed to assist in respiration in the same way as lenticels do." Sometimes the suckers produce leaves and grow up into bushes. Bark greyish-brown, thin. Wood brown or grey, hard, in alternate layers of pore-bearing tissue and loose large-celled tissue without pores. The former layer shows the large moderate-sized or small pores in radial strings of 1 to 5 between the fine, short medullary rays; the latter is much narrower and darker, forming belts which occasionally join each other, so that the layers are clearly not annual growth (Gamble). Branchlets, petiols underside of leaves and inflorescence clothed with a dense white silvery tomentum of very minute hairs. Leaves obovate or elliptic-obtuse, $3\frac{1}{2}$ by $1\frac{1}{2}$, base tapering, at times glabrate beneath. Flowers yellow, sessile, in bracteate heads (contracted cymes) which are arranged in trichotomous corymbs. Calyx $\frac{1}{2}$ in., minutely pubescent, divided to the base into 5 imbricate sepals, corolla tubular glabrate, $\frac{1}{4}$ in. lobes, 4 ovate acute or one lobe shortly bifid or lobes 5, subequal (not rarely all forms on one bush). Stamens 4, in the throat of the tube, another cells parallel. Ovary hairy, imperfectly 4-celled, ovules 4, suspended from a central 4-winged placenta, style short, distinct, sometimes as long as the ovary. Capsule lin., compressed, dehiscing into two thick valves. Seed one, cotyledons large, folded lengthwise, hypocotyl (radicle) villous; the seed often germinates before it falls (Brandis).

Uses :—The roots possess aphrodisiac properties. The unripe seeds are used as poultice to hasten suppuration of boils and abscesses. It is used for small-pox in Madras. "The bark is astringent" (Watt's Dict. I. 361.)

N. O. LABIATÆ.

968. *Ocimum canum*, Sims., H.F.B.I., IV. 607; Roxb. 463 (under *O. album*).

Sans. :—Ājaka, gambhīram, tikṣṇamānu gandhapāṇirjjak.

Vern. :—Bharbhari (Santal); Kukka tulasi (Tel.); Ganjam-korai (Tam.); Nāyitulasi, Rāmatulasi (Kan.); Kāṭṭu-ramatulasi (Mal.).

Eng. :—Rosary tulsi.

Habitat :—Plains and lower hills of India.

Strongly scented erect herbaceous, pubescent plants, branched from the base, 1-2ft., high. Leaves 1-1½ in. narrowly ovate, toothed or entire; petiole very slender, usually ciliate. Bracts stalked, ovate awned, not so large as the nearly glabrous Calyx; spikes 3-8 in.; whorls rather close. Flowers subsessile. Calyx ciliate, two lower Calyx-teeth ovate-lanceolate, awned, longer than the rounded upper; lateral smaller than the lower. Corolla ½ in., long, white. Filaments twice as long as the Corolla, hairy at the knee. Nutlets pitchy black, narrowly ellipsoid, punctulate.

Uses :—During fever, when the extremities are cold, the leaves, made into a paste, are applied to the finger-and toe-nails. The same preparation is used as a cure for parasitical diseases of the skin (Revd. A. Campbell).

969. *O. Basilicum*, Linn. H.F.B.I., IV. 608; *Roxb.* 464.

Syn. :—*O. pilosum*, Willd; *O. caryophyllatum*, *Roxb.* 464.

Sans. :—Vishvatulasi.

Vern. :—Sháhasfaram, raihán (Arab.; Shúhasparam, názbi, dabán-sháh (Pers.); Sabzah (Hind. and Dec.); Tirunitru, Karandai pachch-ai, uruttirajadai (Tam.); Rudra-jeda (Tel.); Ramatulasi, Vibudi patri, tulasi-Krittábu (Mal.); Kám-kastúrí, nirutulasi, Kammagaggare, Karvagagri-gida (Kan.); Bábutulshí (Beng.); Sabza (Guz.); Pinzain Pinzin (Burm.); Sabajhi (Sind); Tulsi, babúri (Pb.).

Habitat :—Throughout tropical and hotter India, cultivated from the Punjab to Travancore. Indigenous in the Punjab on low hills.

N. B.—Commonly known and sold in Bombay as *sabja*. It is used as an offering over the graves every Friday by the Mahomedans of Bombay (K.R.K.)

Herbaceous plants, 2-2ft. high, erect, glabrous or pubescent. The Ceylon form, says Trimen, is generally perfectly smooth; stems and branches green or sometimes purplish. Leaves 1-3 in. long, ovate, toothed or entire, copiously gland-dotted, aromatic sweet-smelling Bracts petiolate. Fruiting calyx very shortly pedicelled, two lower teeth ovate-lanceolate, awned, longer

than the rounded upper, lateral smaller than the lower. Corolla $\frac{1}{3}$ - $\frac{1}{2}$ in. long, large for the genus white pinkish-purple. Ovary 4-partite. Nutlets drupe, about $\frac{1}{12}$ in. long, ellipsoid, black, basal scar small.

Uses :—The seeds of this plant are mucilaginous and cooling, given in infusion in gonorrhœa, diarrhœa and chronic dysentery. The juice of the leaves form an excellent nostrum for the cure of ringworms, and the bruised leaves for scorpion stings. The seeds and flowers also possess stimulant, diuretic and demulcent properties. Diaphoretic and expectorant properties are also ascribed to this plant ; a cold infusion of the seeds can relieve after-pains of parturition. The leaves are useful in the treatment of croup, for which the juice warmed with honey is given. (Kanai Lal De). Dr. Irvine remarks that the seeds in doses of from 3j to 3iii are used as an aphrodisiac. The seeds washed and pounded are used in poultices for unhealthy sores and sinuses. They are also given internally with *sherbet* in cases of habitual constipation and in internal piles. The juice is dropped into the ears for the cure of ear-ache and dulness of hearing. Roots are used for the bowel complaints of children.

The oil, obtained by distilling the leaves with water has a yellowish colour and a strong characteristic smell. It has a specific $\mu_r = 0.9154$ at 15° , and a rotation of $-7.40'$ in a 100 mm. tube. (J. Ch. S. LXXII. pt. I, (1897) p. 429.)

The essential oil of *ocimum basilicum* contains a new terpene, ocimene $C_{10}H_{16}$ closely resembling myrcene; like that terpene, it readily absorbs oxygen, being converted into a colourless viscid substance. Ocimene differs from myrcene, however, in physical characters and on reduction with Sodium in alcohol yields dihydro-ocimene, which gives a crystalline bromine addition compound differing in Sp. Gr. from that obtained by Semmler from dihydro-myrcene. Incidentally, it is noted that basil oil finds useful application for blending with mignonette bouquets (J. S. Ch. I. Dec. 31, 1904, p. 1235.)

Experiments with *Ocimum basilicum* show that plants which have been deprived of their flower buds produce appreciably more essential oil than plants allowed to grow naturally, the increase of oil obtained amounting to about 82 per cent. The weight of the plant was also increased by about 39 per cent. Fecundation and fructification are, therefore, accompanied by a consumption of the odorous principles of the plant (J. S. Ch. I., 15-12-1905, p. 1253.)

970. *O. gratissimum*, Linn., H.F.B.I., IV. 608 ;
Roxb. 464.

Eng. :—Shrubby Basil.

Vern. :—Râm-tulsi (Hind. and Dec.); Râm-tulshi (Beng.); Furanjmishk (Arab.); Palangmishk (Pers.); Elumich-chamtolashi (Tam.); Nimmatulasi (Tel.); Kattu-tuttuvá (Mal.); Banjere (Pb.); Râmatulas (Mar.); Avachibâ-vachi (Guz.)

Habitat :—Bengal, Chittagong, E. Nepal and throughout the Deccan Peninsula.

A strongly-scented, perennial shrub, 4-8ft. glabrescent, much-branched, woody below. Leaves 2-4in. ovate acute crenate or coarsely toothed. Petiole 1-2in. Racemes strict, slender; whorl rather close set; bracts sessile, lanceolate, awned from a rounded base, longer than the Calyx. Calyx pubescent, fruiting $\frac{1}{2}$ in. long, recurved; two lower Calyx-teeth minute, much shorter than the rounded upper, lateral triangular, broader than the lower. Corolla $\frac{1}{2}$ in., hardly exceeding the Calyx, pale yellow. Filaments exerted, knee bearded. Nutlets sub-globose, rugose, with glandular depressions (J. D. Hooker).

Uses :—It is an esteemed remedy in gonorrhœa. Dr. Waitz (*Dis. of Children in Hot Climate*, p. 196) states that in the aphthæ of children he found a strong decoction of the plant effectual when ordinary European remedies had failed. He also advises (*Ibid.*, p. 230) the use of aromatic baths of fumigations prepared with this plant in the treatment of rheumatism and paralysis (Bouton, *Med. Plants of Mauritius* p. 120). Ph. Ind.

A decoction of the leaves is of value in cases of seminal weakness (S. Arjun). The seeds are given in headaches and neuralgia.

The sample of oil of *Ocimum gratissimum* L. prepared at Dabakala is very limpid and golden yellow in colour. Its odour is perfectly similar to that of the oil of ajowan seeds.

Its constants are :

Density at 15° C ...	...	0.9105
Polarimetric rotation ...	...	+0.58'

Soluble in $1\frac{1}{2}$ vol. of 80 per cent alcohol, later an opalescence.

Judging from its odour, this essential oil should contain a large proportion of thymol or carvacrol.

Agitation with a 5 per cent aqueous solution of caustic soda showed that it contains, as a matter of fact, 44 per cent of phenolic constituents. The alkaline solution is decomposed by dilute sulphuric acid, then exhausted with ether. By rapid evaporation in a small porcelain capsule, this solvent

deposits a residue which soon crystallises by simple cooling without the necessity of sowing it with a crystal. This residue was therefore almost entirely composed of thymol. After recrystallisation, the crystals had still a slight reddish coloration, but the manner of their preparation, their melting point (49.3° – 50.5° C.) and their odour are sufficient for their identification.

We do not think that the essential oil of *Ocimum gratissimum* L. has previously been studied, but thymol, which, moreover, has hitherto scarcely been observed except in the Labiatae, has nevertheless already been recorded (see E. Gildemeister, *Les Huiles essentielles* 2nd French Edition, p. 502) in the essential oil of another *Ocimum*, *O. viride*.—(Scien. and Indus. Bull. of Roure-Bertrand fils of Grasse for Oct. 1913 p. 21.)

971. *O. sanctum*, Linn., H.F.B.I., IV. 609; Roxb. 463.

Sans.:—Purnsa, ajaka, tulasi, manjarika, Bhārati, bhūlaka, Divyā, Krishna mūla.

Vern.:—Kāla-tulsi, tulsi barandā, varandā (Hind.); Kālatulsi tulshi (Beng.); Bantulsi, tulsi (Pb.); Tulasi (Bomb.); Tulasa (Mar.); Talasi (Guj.); Tulsi (Dec.); Tulasi, alaṅgai, pirundam. (Tam.); Tulasi, krushna-tulasi, gaggera-chettu (Tel.); Tulashi-gidā (Kan.); Niella tirtua, krishna tulsi, nallu tirtta (Malay.); Lun (Burm.); Mudurutulla (Sing.).

Habitat:—Throughout tropical and hotter India.

A strongly-scented, perennial, herbaceous, erect plant, 1-2 ft. high, softly patently hairy. Stem sometimes woody below. Branches erect, ascending or spreading. Leaves oblong obtuse or acute, 1-2½ in. long, variable in breadth, base narrowed; margin entire or subserrate, hairy on both surfaces and minutely dotted, petioles ½-1 in. long. Floral leaves sessile, ovate-lanceolate. Racemes very slender 6-8 in. long; pedicels slender as long as the Calyx. Calyx short, two lower teeth very long-awned, longer than the broadly oblong upper, lateral broadly ovate, shorter than the lower. Corolla very small, scarcely longer than the Calyx. Filaments exserted, knee villous. Fruiting Calyx ⅙ in. long on a slender pedicel, broadly campanulate, membranous. Nutlets subglobose or broadly oblong, slightly compressed, nearly smooth, pale-red, brown.

Uses:—The leaves have expectorant properties, and their juice is used by native physicians in catarrh and bronchitis. This preparation also is applied to the skin in ring-worm and

other cutaneous diseases. An infusion of the leaves is used as a stomachic in the gastric disorders of children, and in hepatic affections. The dried leaves are powdered and employed as a snuff in ozaena. They are also an effectual means of dislodging maggots. The root is given in decoction as a diaphoretic in malarial fevers. The seeds are mucilaginous and demulcent, and are given in disorders of the genito-urinary system. The juice of the leaves dropped into the ear, is said to be a good remedy for ear-ache.

The Mosquito plant—Ocimum viride.

Sir George Birdwood writes to the "Times" under date April 29th 1904:—"When the Victoria Gardens and Albert Museum were established in Bombay, the men employed on these works were at first so pestered by mosquitos and suffered so much from malarial fever, that on the recommendation of the Hindu *kārbāri* ("manager"), the whole boundary of the gardens was planted with holy basil and any other basil at hand, on which the plague of mosquitos was at once abated, and fever altogether disappeared from among the resident gardeners and temporarily resident masons. The site of the gardens had ever before been one of the worst malarial-stricken spots on the island of Bombay. No one in those days knew anything of the "mosquito-malaria theory" of to-day. I myself used myrrh as a protection against mosquitos. They never came near any bed in which a little myrrh was burnt or a little tincture of myrrh sprinkled when retiring for the night. I never knew natives who used much cinnamon or cloves, etc., in their daily diet ever take malarial fever or die of cholera."

K. R. Kirtikar's note on Sir George Birdwood's remarks:—

Sir George speaks of the *Holy basil*. It is the *Tulsi* plant—the *Ocimum sanctum*, Linn. Among the "other basils," he speaks of is our *Sabjā* plant, *Ocimum basilicum*, Linn. I think, it therefore, to include Sir George's remarks under either *O. sanctum* or *O. basilicum*.

OCIMUM VIRIDE Willd., *Enum Hort.* Berol 629—is from Tropical Africa. See p. 326 Fasc. III. Hooker's Kew Index, 1894.

(1) *OCIMUM FEBRIFUGUM* Lindl. in Bot. Register Tab 753 is given as a synonym by Hooker in the same Index Kewenses at p. 325 of *Ocimum viride*.

(2) *OCIMUM HOPTODON*, Beaum. Fl. Owar II. 59 to 94 is also a synonym, given by Hooker at the same page.

972. *Geniosporum prostratum*, Benth., H.F.B.I.,
IV. 610.

Vern :—Nazel-nagai (Tam.)

Habitat :—Deccan Peninsula, from the Concan southwards,

Annual prostrate herbs. Stems many, from a woody stock, slender, glabrous, pubescent or hirsute. Leaves in distant pairs very variable, from $\frac{1}{4}$ by $\frac{1}{8}$ in. to 2 by $\frac{3}{4}$ in., rather thick, base narrow, sessile or petioled, ovate-lanceolate or oblong, or linear, sparingly toothed. Spikes elongate, slender; whorls close or distant, in slender racemes 2-6 in. long; bracts ovate, acute, reflexed. Flowers green, occasionally white, minute, pedicelled. Calyx hairy, upper lip very variable in size, throat hairy. Corolla $\frac{1}{16}$ in., hairy. Filaments exserted. Fruiting Calyx $\frac{1}{2}$ in., subcampanulate, ribbed, tube not pitted; calyx-throat with a ring of hairs. Nutlets very minute, elliptic, smooth, naked.

Use. :—It is regarded as febrifuge at Pondicherry. (Ph. Ind.).

973. *Orthosiphon stamineus*, Benthams, H.F.B.I., IV. 615.

Syn. :—*Ocimum grandiflorum*, Blume. *O. longiflorum*, Ham.

Habitat. :—Assam and Southern India.

Undershrubs, slender, glabrous or pubescent. Stems 1-2 ft., 4-angled. Leaves in distant pairs, 2-4 in., narrowed into the petiole, ovate, acuminate or coarsely toothed, base cuneate. Racemes very lax-fid. Calyx $\frac{1}{8}$ in., campanulate, Calyx-throat naked; 2 lower teeth subulate. Corolla lin., glabrous, white or purplish. Corolla-tube very slender, thrice as long as the Calyx. Filaments far exserted, capillary, twice as long as the corolla. Nutlets broadly oblong, compressed, rugulose.

Dr. Hooker writes in *Curtis' Bot. Mag.* for April 1st, 1870:—

"It is a very wide-spread Eastern plant from Assam and Burma to the Philippine islands, and from the Nicobars and Siam to Java, Borneo and Cape Goole in North-East Australia. It is a stone plant, a profuse flowerer, and of very pretty appearance."

Uses. :—Dr. Van Itallie uses the leaves for gout and in renal disorders (Ph. J. Oct. 2, 1886, p. 267). In Java, the leaves are made into a tea and used in the treatment of diseases of the kidneys and bladder. In Holland and France, they have been

used successfully in the treatment of diseases of urinary organs (Christy's N. L. P. No. X, p. 104, 1887).

974. *Coleus aromaticus*, Benth., H.F.B.I., IV. 625.

Syn. :—*Plectranthus aromaticus*, Roxb. 466.

Sans. :—Páshána bhedi.

Vern. :—Páthar chur (H.) ; Páter-chur (B.) ; Páthor chur, pathúr chúr, owa (B.) ; Karpura valli (Tel.) ; Pánáchá onvá (Mar.).

Habitat :—Cultivated throughout India.

A perennial herb, shrubby below, hispidly villous or tomentose. Stem 1-3ft., fleshy. Leaves 1-2in., petioled, broadly ovate or cordate, crenate, fleshy, very aromatic. Flowers shortly pedicelled, $\frac{1}{2}$ in. long, whorls distant, densely many-fid. Upper Calyx-lip ovate, acute membranous, lower acuminate. Corolla pale purplish, tube short, throat inflated, lips short. Stamens shortly exserted. Fruiting Calyx sub-erect.

Uses :—"Said by Sanskrit writers to have a specific action on the bladder and to be useful in urinary diseases, vaginal discharges, etc." (U. C. Dutt). It is employed in Cochin China, according to Lourero (*Flor. Cochin.*, p 452), in asthma, chronic coughs, epilepsy and other convulsive affections. Dr. Wight (*Illust.* vol. ii.) speaks of it as a powerful aromatic carminative given in cases of colic in children, in the treatment of which the expressed juice is prescribed mixed with sugar or other suitable vehicle. In his own practice he observed it to produce so decidedly an intoxicating effect that the patient, an European lady, who had taken it on native advice for dyspepsia, had to discontinue it, though otherwise benefiting under its use. The Rev. J. Long (*Journ. Agri.-Hort. Soc. India*, 1858, vol. x, p. 23) also notices its intoxicating properties, and states that the people of Bengal employ it in colic and dyspepsia. (Ph. Ind.) It is much employed (in Ceylon) as a medicine, especially for cattle, and a plant is always to be found growing in a little box suspended on the sides of native carts (Trimen). Used for claret, champagne, and moselle cup—as a flavouring adjunct (K. R. K.)

975. *Anisochilus carnosus*, Wall., H.F.B.I., IV. 627.

Syn. :—*Plectranthus strobiliferus*, Roxb. 466.

Sans. :—Utpalabhedā, ajapāda, induparni.

Vern. :—Panjīrī-kā-pāt, Sitā-ki-panjīrī (Hindi) ; Ajvān-kā-pattā, Pānjīrī (Dec.) ; Karppūra-valli (Tam.) ; Pānajiren, Kāpurli, chora-onvā (Mar.) ; Karpūra-valli (Tel.) ; Chómarú (Mal.) ; Doddā-patri, kuruvelu-balli (Kan.) ; Kattukúrkka, kurkká, patu-kúrkka (Mal.) ; Omamu-áku, róga-chettu (Tel.) ; Ajmánu-pátru, ajamá (Guz.).

Habitat :—Western Himalaya ; Kumaon and Garwhal, and throughout Central and Southern India to Travancore.

An erect annual, 1-2 ft. high. Stem stout, bluntly 4-angled, glabrous or sparsely pubescent, often tinged with red. Leaves rather fleshy, 1-2½ in. long, broadly ovate, obtuse, crenate, rounded or subcordate at the base, usually hairy beneath, petioles ½-1½ in. long. Spikes ½-1½ in. long, 4-gonous in flower and becoming cylindrical in fruit, peduncles slender ; bracts ½ in. long, ovate, acuminate, ciliate, glandular. Calyx pubescent, ½ in. long, enlarging in fruit ; upper lip ovate-lanceolate, acute, ciliolate, bending over the lower lip and closing the mouth of the calyx when in fruit ; lower lip truncate, its membranous ciliate tip reflexed and appressed against the tube. Corolla pale-purple, ¾ in. long, hairy outside ; upper lip short, erect, with shallow lobes. Nutlets suborbicular, compressed, polished and brown when ripe.

Uses :—Ainslie says that the fresh juice of the leaves mixed with sugar-candy is given by the Tamil doctors in Cynanche, and, mixed with sugar and gingelly-oil, is used as a cooling liniment for the head.

Dr. Bidie characterises it as a mild stimulant, expectorant, and particularly useful in the cough of childhood. Its properties depend upon a volatile oil (Ph. Ind.)

976. *Lavendula Burmanni*, Benth, H.F.B.I., IV. 631.

Vern.:—Sarpano-charo; Asmâni galgoto; Jangali lavandar (Duk. and Guz.).

Habitat:—Deccan Peninsula; common in the West, from the Concan to Coorg. Central India, at Indore.

A slender erect herb. Stems 2-3 ft. high, simple or branched, 4-angled, pubescent. Leaves sessile or nearly so, 2-4 in. long and as broad as long, pinnatipartite or deeply pinnatisect; lobes linear, entire or cut or toothed, obtuse or subacute, glabrous or pubescent above, pale and pubescent beneath. Spikes simple or more or less branched, or sometimes subumbellate, bracts pubescent, $\frac{1}{4}$ - $\frac{1}{3}$ in. long, broadly ovate and strongly nerved at the base, the apex ending in a long capillary awn. Calyx (in fruit) grey-pubescent, $\frac{1}{2}$ in. long, tube somewhat curved; teeth lanceolate, acute and with pennicillate tips. Corolla blue or white, nearly $\frac{1}{2}$ in. long, hairy outside; tube $\frac{1}{3}$ in. long, slender below; upper lip $\frac{1}{4}$ in. long; middle lobe of lower lip twice as long as the 2 lateral ones. Nutlets oblong-ellipsoid, mucilaginous when moistened (Duthie).

Uses:—Mr. Indrajī, the author of "Vanaspati Shāstra," a book containing valuable information on the flora of the Western Presidency, India, writes that it is not known whether anybody else has made use of the plant except that the villagers and shepherds of the Barda Hills in Kathiawar have used it as a medicine.

In places where the plant grows serpents abound. It is supposed to act as an antidote for poison; the roots are rubbed with water and the solution or the paste is applied over the sting of wild animals. The powdered leaves are given for inhalation to the person who has been stung by a serpent in order to prevent him from falling into sleep.

Colonel Kirtikar having drawn the attention of Prof. D. D. Kanga, to the importance of this plant, who extracted oil from its flowers, and leaves.

According to him "the oil obtained from the flowers was quite different in all respects from that obtained from the leaves; it differed both physically and chemically; the yield of oil was greater from the leaves than from the flowers.

The following table will give some idea as to the differences in the physical properties and chemical composition of the two oils :

	Oil from flowers.		Oil from leaves.	
Colour	Red		Yellow	
Odour	Pleasant, somewhat peppermint like.		Very pleasant, resembling lemon-grass.	
Specific gravity	D $\frac{24.5^{\circ}}{15^{\circ}}$	0.923	D $\frac{26.75^{\circ}}{15^{\circ}}$	0.895
Optical Rotation	Colour too deep to allow of determination.		[a] _D -0.87°	
Refractive Index	25°	1.4683	28.5°	1.4822
	n _D		n _D	
Solubility in 70% alcohol	1 part in 28 parts		1 part in 2 parts	
Saponification value	149.5		44.25	
Acetyl value	199		141.4.	

977. *Pogostemon plectranthoides*, Desf., H.F.B.I., IV. 632.

Vern.—*Pângla* (Deccan) and Konkan also *Pângla*.

Habitat.—Western Himalaya, from Nepal to Simla; Lower Bengal and Behar. The Concan, Canara and the Circars.

A strongly-scented, large, gregarious, shrubby, hoary, pubescent bush; branches round, often dark purple. Young parts tomentose. Leaves opposite, stalked ovate acute, doubly-toothed or serrate, long pointed, 3-6in., longer than the petiole. Panicle usually elongate; whorls subsecured, crowded in large cylindric spikes. Floral leaves bract-like, hairy glandular, ovate acute. Flowers hardly $\frac{1}{4}$ in. long, white tinged with, pink. Calyx hirsute, tubular 5-toothed. Calyx-teeth shortly triangular lanceolate, ciliate, nearly equal. Corolla-tube, curved, longer than the calyx. Limb spreading, 4-lobed, lobes nearly equal, obtuse. Stamens 4 nearly equal, far protruding. Filaments lilac, bearded with long, lilac, beaded hairs (Collett and J. D. Hooker).

Use.—Used like *P. piriiflorus*. (Syn. *P. purpuricaulis*, Dalz.) It is the source of the *phângla* (see the correspondence on the subject, pp. 243-246 of Vol. I of Report Proceed Central Indigen Drugs Com.)

978. *P. purpurascens*, Dalz., H.F.B.I., IV. 632.

Habitat.—Deccan and Manipur. Dr. Watt says: "It is a very striking species and has the somewhat remarkable distribution

of re-appearing in Manipur... while it nowhere occurs in the vast expanse of the tableland of India that lies between the Deccan and Manipur."

An erect herb, softly villous, with spreading hairs. Stem 4-angled. Leaves sometimes 9 inches long, membranous, long-petioled, ovate or ovate-lanceolate, sinuate or cut and toothed or crenate, base narrowly cuneate. Whorls dense-fid globose, secund, continuous or separate, in long peduncled hirsute spikes sometimes 9 in. long. Bracts narrow, falcate, equalling the Calyx, ciliate. Calyx $\frac{1}{2}$ in. long, tubular, teeth long, subulate, ciliate. Corolla white, with purple upper lip (probably a form of *P. arviolora* (J. D. Hooker).

Use.—Used like *P. parviflorus*. It seems more likely than either *P. plectranthoides* or *P. parviflorus* to be used medicinally (Watt).

979. *P. parviflorus*, Benth., H.F.B.I., IV. 632.

Vern. :—Phángla, pángla (Bomb.).

Habitat :—Subtropical Himalaya, from Kumaon to Bhotan. Assam, Khasia Hills, and Silhet, Chittagong. West Deccan Peninsula, from the Concan to the Anamallay.

An annual herb, stout erect, branched, glabrous pubescent or scaberulous. Leaves long-petioled, ovate or ovate-lanceolate, singly or doubly crenate-toothed or serrate, base cuneate. Whorls dense-fid, subglobose in dense cylindric or one-sided softly hairy spikes. Bracts elliptic ovate, exceeding the hirsute calyx. Calyx $\frac{1}{2}$ in. long narrow, usually purplish. Calyx-teeth short, triangular-lanceolate, ciliate. The stem and branches are usually dark-purple, but not constantly.

Uses :—The fresh leaves, when bruised, are applied as a cataplasm in order to clean wounds and promote healthy granulation. The roots are reputed to be a remedy for the bite of the *Phursa* snake (*Echis Carinata*) (Dymock). In Satara, the juice of the leaves is given in colic and fever (B. D. Basu).

Surg.-Maj. J. Parker, Med. Store-keeper to Gov., Bombay, in his letter dated 21st April 1896, to the Sec., Indigen. Drugs Com., Calcutta wrote :—

The root juice is used internally and externally in snake-bite (*Phursa*), but the plant is said to be efficacious in the fresh state only. It would be well to

have the supposed use of *phangala* in snake-bite carefully investigated, for, although much has already been done in this direction, the question apparently is still undecided. Not commercial, but can readily be collected. Could be cultivated from the seed. An ammoniacal tincture might be useful in snake-bite (Proceed. Indigen. Drugs Com., Vol. I. p. 158.)

Chemical composition.—The most interesting principle detected in the plant was an alkaloid. After repeated purification it was left as a yellow varnish with slightly bitter and mouse-like flavour. It was more soluble in chloroform than in ether. No special colour reactions were noted. We also detected the presence of trimethylamine, and a volatile principle with a cedar-wood odour. Resinous principles were also present, with astringent matter. We provisionally call the alkaloid *Pogostemonine* (Pharmacographia Indica, III. 101).

980. *P. patchouli*, *Pelletier*, H.F.B.I., iv. 633.

Syn.:—*P. Heyneanus*, *Benth.*

Vern.:—Peholi; Pachôlî; Pachâpât; Panel; Mali; Pachpanadi; Pako nilam (Bomb.).

Habitat:—Western Peninsula, from Bombay southwards, wild and cultivated.

An erect, branched, pubescent or glabrate herb, 2-3 ft. high. Leaves 2-3 in., long-petioled, ovate, acute, acuminate or obtuse crenate or simply or doubly toothed or incised, membranous; base cuneate petiole, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. Spikes 3-6 in., rarely short and dense. Whorls $\frac{1}{2}$ in., diam subglobose, many and dense-fid, distinct or sub-confluent on the slender pubescent or tomentose panicle spikes; bracts elliptic, acute, equalling the calyx or shorter. Calyx $\frac{1}{4}$ in., pubescent or tomentose, triangular, ciliate. Corolla very small, tube shortly exerted.

Use:—Sir George Watt, in his *Commercial Products of India*, p. 904, writes:—

“In the Central Provinces and Berar I found *P. Heyneanus* growing in the betel-leaf houses and sold apparently by the owners to the perfume manufacturers. This may be, at least partly, the patchouli of Bombay.”

The subject requires further investigation. Patchouli is also obtained from the following plant.

981. *Microtæna Cymosa*, *Prain*.

Habitat:—Assam Manipur and Burma.

Stems 40-100 cm., lower branches 15-20 cm. petioles 2-3 cm. long, laminae 4-7 cm. long 3-5 cm. wide, hairy on both surfaces, cymes sometimes

loosely paniculate irregularly branched, calyx 2.5 mm. (tube 2 mm.), corolla 14 mm. (tube infundibuliform 6 mm., upper lip 8 mm.), pollen grains minute oval smooth, nutlets 1.25 mm.—The cultivated plant smells very strongly of Patchouli, much more so than does the Patchouli plant of commerce, but it is only grown as a curiosity; the natives of the hills of Assam do not grow this plant of the true Patchouli plant, nor do they know or use the prepared article: the Shan hill plant is devoid of smell. (Prain).

982. *Colebrookia oppositifolia*, Smith, H.F.B.I.,
iv. 642; Roxb. 467.

Syn. :—*C. ternifolia*, Roxb. 466.

Vern. :—Pansra (H.); Shakardána (Trans-Indus); Duss, sampru, suali, briali, casuti, barmera, phisbekkar (Pb.); Dulsahat (Kumaon); Dosul (Nepal); Bindla (Dehra Dun); Bhainsa, barsa pakor (Santal); Bahmani, dasai, dasari (Bomb.).

Habitat :—Subtropical Himalaya, from the Salt Range and Peshawar to Sikkim, Behar, Central India and the Deccan Peninsula to Travancore.

A densely woolly hoary shrub 5-10ft., erect. Trunk stout; branches stout, terete often whorled in threes. Leaves opposite or in threes, shortly stalked, lanceolate, 4-8in., crenate, long-pointed; upper surface pubescent, wrinkled, lower grey-tomentose. Flowers minute white, 2-or 1-sexual, the male and female often on different plants in large whorls, crowded in long, cylindric, erect spikes, axillary or paniculate at the end of branches. Calyx deeply 5-lobed; lobes linear, hairy, becoming much elongated, and leathery in fruit when the tips often turn purple. Corolla pubescent; tube as long as the Calyx; limb spreading, 4-lobed, lobes unequal. Stamens 4, equal, protruding in male flowers, included in the female, filament naked. Style protruding in female flowers, wanting in male flowers. Nutlet usually only one, tip hairy (Collett). The spikes are suggestive of Indian squirrels' tails (Nairne).

Uses :—The leaves are applied to wounds and bruises (Stewart). A preparation from the root is used by the Santalis in epilepsy (Revd. A. Campbell). The down on the stem and leaves is used by the Paharias of Sikkim to extract worms from bad sores on their legs (Gamble).

983. *Mentha viridis*, Linn., H.F.B.I., IV. 647.

Vern. :—Pudiná (B., Mar., Guz., Tel. and Sind.); Pudinâ, pudinâ kuhi, pahari pudinâ (Pb.); Pahari pudinâ (Hind.); Nagbó, shah-sufiam (Pers.)

Habitat :—Cultivated in Indian gardens.

A perennial herb, with a pungent smell, glabrous or nearly so. Leaves all sessile, or the lower only petioled, oblong-lanceolate, subacute, sessile, smooth above. Spikes slender. Whorls in terminal spikes; bracts minute. Throat of Calyx glabrous. Corolla glabrous without and within. Probably a cultivated form of *M. sylvestris* (J. D. Hooker).

Uses :—The medicinal properties and uses of the oil obtained by distillation from the fresh herb, are similar to those of Peppermint, but it is only less powerful in its action. The seeds are mucilaginous. Leaves given in fever and bronchitis. Decoction used as lotion for aphthæ (Dr. Emerson).

984. *M. piperita*, Linn., H.F.B.I., IV. 647.

Habitat :—Cultivated in Indian gardens.

A perennial glabrous strong-scented herb. Leaves petioled 1-4in., acute or obtuse at base, coarsely serrate, smooth above, rarely sparingly, hairy on the nerves below, ovate or oblong-lanceolate, upper smaller, sometimes bracteiform. Whorls in terminal spikes. Spikes cylindric, interrupted below. Bracts minute. Pedicels and flowers glabrous, or very sparingly hispid. Calyx often red. Probably a garden form *M. Aquatica*, as suggested by Bentham (J. D. Hooker).

Use :—Official in the British and Indian Pharmacopœias.

985. *M. sylvestris*, Linn., H.F.B.I., IV. 647.

Vern. :—Pudina (H., B., M., G. Tam.); Chetni-Maragi (Kan.).

Habitat :—Temperate Western Himalaya, from Kashmir to Garhwal.

A strongly scented erect or diffuse herb. Rootstock creeping; stems 1-3ft., hoary-pubescent. Leaves nearly sessile, lanceolate, ovate or oblong, 1-3in., sharply toothed, acute; upper surface hoary pubescent, lower white tomentose. Flowers small, lilac in large whorls crowded in axillary and terminal cylindric

tapering spikes; lower floral leaves leaflike, upper smaller lanceolate. Calyx hairy, bell-shaped acutely 5-toothed. Corolla-tube included in the Calyx; limb erect, 4-lobed, lobes, equal. Stamens 4, equal, protruding, filaments naked.

Uses :—The leaves are officinal as astringent. *Pudināh* of Bombay gardens has exactly the odour of peppermint (Dymock).

A decoction is said to be used in fevers and heat apoplexy by the Afghans.

The oil possesses sp-gr. O. 9701 at 15° C.; $d_4^{20} = +31^{\circ} 30'$ (100 m); $n_{D_20}^{20} = 1.49544$; acid value, 2.4; ester value, 20.9; ester value after acetylation, 171.4; soluble in 3 vols. of 70 per cent. alcohol; (the diluted solution showed slight opalescence); faintly mint-like odour; yellow colour. It is obvious that the saponification value of 171.4 after acetylation of the oil cannot in this case be indicative of the menthol content, which, judging by this factor, should have been 54.8 per cent.; for, as a matter of fact, it contains but little menthol. The mint-like odour is chiefly due to the presence of pulegone, of which the oil contains 40 per cent. (isolated with Sodium Sulphite). In addition to this, a phenol (probably carvacrol) can be detected.

Owing to the simultaneous occurrence in it of menthol, pulegone and a phenol, the oil cannot be used either as peppermint oil or as European pennyroyal or origanum oil. It is differentiated from oil of peppermint by its much higher specific gravity and by its pronounced dextra-rotatory power.

(Schimmel's Report, April 1910, quoted in J. Ch. I. for June 15, 1910, p. 716).

986. *M. arvensis*, Linn., H.F.B.I., IV. 648, Roxb. 460.

Vern. :—Pudināh (Beng., Hind. and Dec.); Pudíná, I-ech-chak-kirai (Tam.); Pudíná, Tga-engili-kúra (Tel.); Putiyina (Mal.); Pudíná (Guz.); Bhúdina (Burm.); Chetni-maragu (Kan.).

Habitat :—Western Himalaya and Kashmir.

A strong-scented perennial herb, hairy or glabrate. Stem 1-2 ft. Leaves shortly petioled or sessile, oblong-ovate, or lanceolate, 1-2 in., obtusely or acutely serrate, petioled or sessile. Bracts acute, shorter than the flowers, whorls axillary, capitate. Calyx hairy; Calyx-teeth triangular or lanceolate. Corolla hairy without and within.

Use :—The dried plant is refrigerant, stomachic, diuretic and stimulant medicine. It possesses antispasmodic and emmenagogue properties (Fleming). Used in jaundice. The dried plant powdered is used as a dentifrice.

The scent of the fresh fruit is said to be useful to relieve fainting (Dr. Emerson). Frequently given to stop vomiting; a

chutney prepared from the fresh herb is in use all over Bengal. (Dr. Kanai Lal De).

987. *Lycopus europæus*, Linn. H.F.B.I. IV. 648.

Vern. :—Gandamgúndú ; Jalnim (Kashmir).

Eng. :—Gipsy wort.

Habitat :—Western Himalaya and Kashmir.

Perennial marsh herbs, glabrous or puberulous. Rootstock creeping or stoloniform. Stem 1-3ft. Leaves subsessile, elliptic-oblong, sometimes pinnatifid, sinuate-toothed or serrate. Corolla bluish white, dotted with purple, hairy within. Stamens minute. Nutlets longer than the Calyx-tube.

Use :—Used in the Punjab as a cooling drug (Stewart). The leaves are used externally as a poultice to cleanse foul wounds.

988. *Origanum marjorana*, Linn., H.F.B.I. IV. 648.

Vern. :—Murwo (Sind) ; Murwa (H.) ; Maroo (Tam.) ; Bantulsi (Kumaon).

Eng. :—Sweet Marjoram.

Habitat :—Extensively cultivated in India.

An aromatic herb, 1-2ft. Leaves purplish and white, petioled, ovate-oblong, glaucous.

Uses :—The seeds are officinal, and are considered astringent and a remedy for colic. The leaves are eaten along with *Gynandropsis pentaphylla*, D. C., as a remedy for colic. An essential oil is also distilled from them, used as a perfume and for hot fomentations in acute diarrhoea. Aromatic, carminative, and stimulant (Watt).

Chemical composition.—The volatile oil (*Oleum marjoranæ*) is thin, yellowish, of the specific gravity 0.89, boils above 163° C., is readily soluble in alcohol, has the aromatic odour of the herb, and, according to Beilstein and E. Wiegand (1882), contains a terpene, boiling at 178° C. and forming a liquid compound with HCl; the fraction boiling between 200° and 220° C. has the composition C¹¹H²⁰O, and is not affected by metallic sodium (*Stille and Maisch*.)

989. *O. vulgare*, Linn., H.F.B.I. IV. 648.

Vern. :—Mirzanjosh (Pb. and Hind.) ; Mizangosh (Pers.) ; Sáthra (H.) ; Mridu-maru-vamu (Tel.)

Habitat :—Temperate Himalaya, from Kashmir to Sikkim.

An aromatic erect herb, corymbosely branched, 1-3ft., more or less clothed with short hairs, glabrous, at times prostrate. Rootstock short, stoloniferous. Leaves entire or toothed, $\frac{1}{2}$ -lin. long, lower early withering, stalked, $\frac{3}{4}$ in. broad. Flowers dimorphic small, pink (Female paler), crowded in numerous 4-sided spikes, $\frac{1}{4}$ -lin. long, in clusters or heads at the end of branches sometimes forming terminal panicles; floral leaves bract-like lanceolate longer than the calyx, overlapping, often tinged with purple. Calyx bell-shaped enlarged in fruit; 5-toothed, mouth hairy within, calyx-teeth short; Corolla-tube longer than the calyx; limb 2-lipped, upper lip erect, nearly flat, notched, lower, spreading 3-lobed. Stamens 4 in unequal pair, slightly protruding. Nutlets smooth dry.

Uses :—It yields a volatile oil, useful as an aromatic, stimulant and tonic in colic, diarrhoea and hysteria. It is also applied in chronic rheumatism and tooth-ache. It is said to stimulate the growth of hair, and also to act as an emmenagogue (Stewart).

Considered a good "pick-me-up" after a carousal. The oil is dropped into the ear for earache (Dr. Emerson).

The infusion is gently tonic, also carminative, stimulant, emmenagogue and diaphoretic. It is also used as a fomentation externally (Brunton).

The Greeks used it extensively, both internally and for making fomentations. It was esteemed as a remedy for narcotic poisons, convulsions and dropsy, by them, and also by the older herbalists of Europe.—The oil is still an ingredient in some embrocations in use in England, and has a special reputation for toothache (Sowerby's English Botany.).

A sample from Ramnagar, United Provinces, yielded to ether 27.3 per cent. of a light-coloured drying oil. The oil had an acid value of 11.3, saponification value 194.9, iodine value 190.5 (Hooper).

990. *Thymus Serpyllum*, Linn. H.F.B.I. IV. 649.

Vern. :—Másho, rángsbúr, marizha (Pb.); Ban-ajwain (H.)

Habitat :—Western Temperate Himalaya, from Kashmir to Kumaon,

A small, slender much-branched shrub, very aromatic, hairy more or less, or glabrous, procumbent or ascending, often tufted, usually about 6-12 in. Rootstock woody. Leaves usually nearly sessile, $\frac{1}{8}$ - $\frac{1}{4}$ in., gland-dotted, ovate-oblong, entire obtuse. Whorls capitate. Flowers small, purple, sometimes one-sexual; males largest, in small whorls crowded in short terminal spikes. Calyx hairy, gland-dotted, 2-lipped, mouth hairy within; upper lip broad, 3-toothed, lower 2-parted, segments linear. Calyx-teeth ciliate. Corolla $\frac{1}{4}$ - $\frac{1}{2}$ in., purple, very variable. Corolla-tube as long as the Calyx; limb 2-lipped, upper-lip nearly erect, flat notched, lower spreading, 3-lobed. Stamens 4, nearly equal, protruding. Nutlets nearly smooth.

Uses :—On the Chenab, in the Punjab, the seeds are given as a vermifuge (Stewart). Used by the Hakims in weak vision, complaints of stomach and liver, suppression of urine and menstruation (Honnigberger).

The oil is sometimes applied as a remedy in toothache. In France a decoction of the plant has been used to cure the itch and some other skin disorders. Linnæus recommends it for curing headache and the effects of intoxication (Sowerby's English Botany).

Chemical composition.—The volatile oil of *Thymus Serpyllum*, Linn., according to E. Buri (1879), contains two phenols which do not congeal at 10° C., and of which one imparts a yellowish-green colour to ferric chloride, and yields a sulphonic acid, the salts of which, like the thymol sulphonates, produce with ferric salts and intense blue colour. Jahns (1880) reported also the presence of a little thymol and carvacrol. Messrs. Schimmel & Co. (Report, April 1891) obtained by distillation of the leaves and stalks 0.3 per cent. of an oil having a very pleasant melissa-like aroma with a slight soupçon of thyme. Its specific gravity at 15° C. was 0.917 (Pharmacogr. Ind.).

991. *Hyssopus officinalis*, Linn., H.F.B.I. IV. 649.

Vern. :—Zúfah yabis (Arab. and Pers.). "The drug is generally attributed to *Hyssopus officinalis*, but this cannot be correct, as the flowers are in oblong spikes. It is imported from Persia" (Pharmacogr. Ind. III. 116).

Habitat :—Western Himalaya, from Kashmir to Kumaon.

An undershrub, usually glabrous. Stem below branched, woody 1-2 ft., erect or diffuse. Leaves sessile, oblong linear or

lanceolate, entire, obtuse, whorls 6-15-fid., second axillary and terminal spikes. Calyx fruiting, $\frac{1}{4}$ - $\frac{1}{4}$ in. long. Corolla bluish purple. Nutlets narrow nearly smooth triquetrous.

Use :—Used for coughs and asthma in infusion ; also in tooth-ache, uterine or vesical affections, and indurations of the liver or spleen. Leaves are said to be stimulant, stomachic, emmenagogue and carminative ; useful in hysteria and colic. Also used as a poultice to bruises, especially of the eyes (Watt). The sap of the leaves made into a syrup with sugar and honey is used as a vermifuge for round-worms (Dr. Emerson).

992. *Micromeria capitellata* Benth., H.F.B.I., IV. 649.

Habitat :—Behar, on Parasnath. Western Himalaya, Dehra Doon. Western Ghats, from the Concan to the Nilghiris.

A pubescent very aromatic shrub. Rootstock woody. Stems 1-2ft., tall, slender, erect. Leaves entire or subserrate, obtuse, $\frac{1}{2}$ -lin., ovate or oblong, flat ; floral small ; petiole short, bract short. Whorls subglobose, distant in slender spikes, lower peduncled. Flowers $\frac{1}{2}$ in. Calyx villous ; teeth long, subulate, erect ; fruiting $\frac{1}{2}$ in. Nutlets smooth.

Uses :—According to Mr. Dalzell, who first brought it to notice, under the name of *Marrubium Malcolmianum*, " it is entitled to be called East Indian Peppermint, being possessed of all the aromatic and carminative qualities of *Mentha piperita*" (*Hooker's Journ. of Bot.*, 1852, vol. iv., p. 109).

993. *Calamintha Clinopodium*, Benth., H.F.B.I. IV. 650.

Vern. :—Asába-el-fatiyát (Arab.).

Habitat :—Western Temperate Himalaya, from Kashmir to Kumaon.

A softly hairy herb. Stems erect 3ft., slender, subsimple. Rootstock woody, stoloniferous. Leaves ovate, 1-1 $\frac{3}{4}$ in., entire or toothed, remote. Whorls densi-fid, terminal and axillary $\frac{3}{4}$ -lin. diam., depressed. The whorls are thus described by

Collett:—"Many flowered, crowded, compact, surrounded by an involucre of numerous long bracts." Bracts filiform or linear, hairy, equalling the Calyx. Calyx $\frac{1}{2}$ in. long, hispid, usually curved. Corolla $\frac{1}{2}$ -1 in. Stamens in unequal pair.

Use:—"The authors of the *Pharmacographia Indica* write:—"The plant from which the seeds of *Faranjmishk* or *Biranjmishk*, Arabic forms of the Persian name *Palangmishk*, are said to be obtained, is described by Persian Medical writers as having a clove-like odour, on which account it is often called *Karanfal-i-bustani*, garden clove. According to Abu Hanfeh, it is the same as the plant called by the Arabs *Asaba-el-fatiyat*. It is considered to be cephalic, astringent, cardiacal, tonic and carminative."

994. *Melissa parviflora*, Benth., H.F.B.I. IV. 651.

Vern.:--Badrunj boya (Pers.).

Habitat:--Temperate Himalaya, from Garhwal to Sikkim and Mishmi. Khasia Mts.

A pubescent or glabrate herb. Stem tall erect, angles hirsute. Leaves 1-4 in., ovate or ovate-lanceolate acute, base acute, rotund or cordate; petiole $\frac{1}{2}$ -1 in, slender. Whorls numerous few or many-fid; flowers pedicelled. Calyx $\frac{1}{4}$ - $\frac{1}{2}$ in. Calyx-teeth very variable in length of the acute points; bracts narrow. Corolla white; tube very short, scarcely exceeding the Calyx.

Hooker writes:—"Very near *M. officinalis*, which has its Eastern limit in Eastern Persia, but the leaves are more acute and the lower calyx teeth are broader and shorter, but these are variable characters in the European plant."

Uses:--Mr. Honnigberger speaks of *M. officinalis*, Linn., being used in the Punjab as stomachic, also in liver and heart diseases, and weakness of sight, etc.

Of the *M. officinalis*, "the leaves drunk with wine or applied outwardly are good against the stings of venomous beasts and the bitings of mad dogs; also it helpeth the toothache, the mouth being washed with a decoction, and is likewise good

for those that cannot take breath unless they hold their necks upright" (Gerard).

995. *Perowskia abrotanoides*, Kiril., H.F.B.I. IV.
652.

Vern. :—Shanshohai (Pushtu).

Habitat :—Western Tibet ; Afghanistan and Baluchistan.

An erect much-branched, diæcious strong-scented twiggy shrub or undershrub 2-4ft., woody below, densely or sparsely clothed with white or grey stellate scurf. Leaves opposite, linear-oblong sometimes bipinnatisect, crenatures or lobes or segments obtuse. Flowers small, whorls small, distant, in simple or compound or paniced spikes, 2-or more-fid. Calyx clothed with long cottony wool. Stamens 2, lower fertile. Nutlets pyriform, smooth dry.

Use :—At Ziarat (Baluchistan), the plant is used as a cooling medicine (Lace, in Watt's Dic. Ec. Pr.)

996. *Meriandra strobilifera* Benth., H.F.B.I., IV.
652

Habitat :—Western Temperate Himalaya, on dry rocks, from Simla to Kumaon.

An erect strongly-scented tomentose shrub, 2-5ft. Branches obscurely angled. Leaves coriaceous, thick, shortly stalked, oblong or lanceolate. 2-4 by $\frac{3}{4}$ -1 $\frac{1}{2}$ in., crenate, base prolonged downwards in 2 pointed lobes ; upper surface pubescent, closely wrinkled ; lower white tomentose. Flowers small white in large whorls crowded in erect tomentose, 4-sided, often paniculate spikes ; spikes with woody bracts in fruit (Kanjilal) ; floral leaves small, bract-like sessile ovate, overlapping. Calyx tubular-ovoid, 2-lipped ; upper lip concave, entire, lower 2-toothed. Corolla-tube as long as the Calyx. Stamens 2, anthers protruding (Collett). Nutlets obovoid, smooth brown.

Uses :—The same as of the following species, viz., *M. Bengalensis*, Benth.

997. *M. Bengalensis*, Benth. H.F.B.I., IV. 653.

Syn. :—*Salvia bengalensis*, Roxb. 49.

Habitat :—Native of Abyssinia ; cultivated in India.

Vern :—Kapur-ka-patta (H.) ; Sesti (Bom.); Shima-karpuram-áku (Tam.)

A large strongly-scented, straggling shrub, finely tomentose or hoary. Branches cylindric. Leaves 2-3 by 1-1½ in., finely crenulate, obtuse thinner than in *M. strobilifera*, as finely granulate above and reticulate beneath, base rounded or bractate. Petiole slender, ¼-½ in., spikes terminal with interrupted ebracteate globose whorls. Whorls ¼-½ in. diam., villous. Calyx ¼ in. long, pedicelled, teeth acute. Corolla white, lips spreading or recurved. Nutlets obovoid, smooth, brown (J. D. Hooker).

Uses :—The camphoraceous bitter plant possessing the properties of Sage (*Salvia officinalis*). Leaves are much used in native practice, an infusion being an useful application to aphthæ and sore throats, according to Mr. Rama Churn Bose, who also notices its power to diminish or arrest the secretion of milk (*Pharm. Ind.*).

998. *Salvia moorcroftiana*, Wall., H.F.B.I., IV. 654.

Vern.—Kâli-jari ; Shobri ; Gurgumna (Pb.).

Habitat.—Western Temperate Himalaya, from Kashmir to Kumaon.

A very robust tall erect herb, clothed with white, usually woolly or cottony hairs on stem, leaves beneath and often above petiole and branches of panicle ; very rarely glabrous. Stems 1½-3 ft. Leaves thick, long stalked, ovate or oblong, 5-8 by 2½-6 in., sinuately and irregularly lobed, crenate or sharply toothed ; upper surface nearly glabrous or cottony-tomentose, closely wrinkled ; lower white tomentose. Flowers 1 in. long, pale blue, lilac or nearly white, in many distant whorls ; bracts large, pale, green-veined, orbicular, abruptly pointed. Calyx bristly, bell-shaped ; teeth spinous ; upper-lip 3-toothed. Corolla-tube much longer than the calyx ; upper lip long, curved, flattened, concave (Collett). Nutlets subglobose (J. D. Hooker).

Use.—The root is given in cough, and the seeds are used as an emetic. The leaves are a medicine for guinea-worm and itch, and in the form of poultice applied to wounds. At Lahore, the seeds are given in colic and dysentery, and are applied to boils (Stewart). The seeds are given for hæmorrhoids (Bellew).

999. *S. lanata*, Roxb., H.F.B.I., IV. 654.

Habitat :—Western Himalaya, at altitudes from 5,000 to 8,000 feet.

Robust erect herbs, softly densely wooly, white tomentose. Stems usually many from the root ; 1-1½ ft. simple or branched. Leaves mostly radical, sessile oblong-lanceolate 3-6 by ¾-1½ in. toothed ; upper surface tomentose or nearly glabrous, closely wrinkled ; lower tomentose. Flowers ¾ in. long, blue-grey in distant whorls ; bracts viscidly hairy, large orbicular ; abruptly pointed. Calyx viscidly hairy, bell-shaped ; teeth spinous : upper lip 3-toothed. Corolla-tube not longer than the Calyx ; upper lip long, curved, flattened concave (Collett). Nutlets ⅓ in., brown (J. D. Hooker).

Use :—According to Stewart, this species is often confused with *S. Moorcroftiana*. It may be used separately, or as an adulterant.

1000. *S. plebeia*, Br., H.F.B.I., IV. 655.

Syn.—*S. brachiata*, Roxb., 49.

Vern.—Sathi, samûndarsok (Pb.) ; Kinro (Sind.) ; Kokaburadi, bhû-tulsi (B). The seeds called Kammar-kas (Bomb.).

Habitat.—Throughout India, in the plains, and ascending the hills to 5,000 feet.

An annual roughly pubescent herb. Stem stout erect hoary or scaberulous, 6-18 in. ; fastigiately branched. Inflorescence glandular. Leaves petioled, oblong obtuse, or upper ovate acute crenate ; 1-3 in., narrowed at both ends ; floral small lanceolate. Spikes paniced, often fastigate. Flowers hardly ¼ in. long, lilac or nearly white, in small whorls in numerous slender paniced racemes ; bracts small, lower leaf-like, upper lanceolate (Collett). Whorls very numerous. Calyx pedicelled ¼ in.,

bell-shaped, upper calyx-lip entire, lower obtusely 2-toothed. Stamens very small whitish. Corolla-tube very short included upper lip short, nearly straight, slightly flattened, concave. Nutlets very minute, $\frac{3}{16}$ in. long, ellipsoid (J.D. Hooker).

Use.—The seeds are used in gonorrhœa and memorrhagia (Stewart). They are used in Bombay to increase sexual powers (Dymock).

1001. *S. ægyptica*, Benth., H.F.B.I., IV. 656.

Vern.—Tukhm malangá (Pb.).

Habitat.—The Punjab plains and hills, from Delhi westward; and Scinde.

A very dwarf scaberulous, hispid or hoary much-branched undershrub. Branched from the base, straggling, divaricate, rigid. Leaves rarely lin., small, few, subsessile, linear or lanceolate, acute rigid, crenate whorls remote 2-3-fid. Flowers small-hardly $\frac{1}{4}$ in. long. Calyx glandular hairy, nodding, pedicelled, ovoid campanulate, fruiting $\frac{1}{4}$ in. long; upper lip orbicular minutely 3-toothed, teeth of lower subulate. Corolla-tube very short, not exerted, limb very small, upper lip short, nearly straight, slightly flattened concave. Nutlets $\frac{1}{2}$ in. long, narrowly oblong, nearly black.

Var. pumila.—This is a variety named in Hooker under *Salviaægyptica*. It is more scabrid and hispid. Leaves very rigid and rugose. Calyx villous with long hairs.

Use.—The seeds are used in diarrhœa, gonorrhœa and hæmorrhoids (Stewart).

In Mexico and in some other parts of the United States, a drink is made from the seeds of several species of *Salvia*. In his "Notes on Economic Botany of the Western United States" (reprinted in the Ph. J., 21-2-1880), Surgeon J. T. Rothrock writes:—

The seeds are collected, roasted and ground, in the native way, between two stones. This puts it in the condition in which I first saw it. It is used as a food by mixing it with water and enough sugar to suit the taste. It soon develops into a copious mucilaginous mass, several times the original bulk. The taste is somewhat suggestive of linseed meal. One soon acquires a fondness for it, and eats it rather in the way of a luxury than with any reference to the fact that it is exceedingly nutritious besides. It is in great demand among the knowing ones who have a desert to cross, or who expect to encounter a scarcity of water, and what there is, of bad quality. By preparing it so that it can be used as a drink, it seems to assuage thirst, to improve

the taste of water, and, in addition, to lessen the quantity of water taken, which in hot countries is often so excessive as to produce serious illness. As a remedy it is invaluable from its demulcent properties, in cases of gastro-intestinal disorders. It also holds a place among domestic remedies, for the same purpose that flax seed occasionally does with us, i.e., a grain of the seed is placed in the eye (where it gives no pain) to form a mucilage by means of which a foreign body may be removed from the organ. I have found it of great service as a poultice.

With reference to the above, Mr. John M. Maisch wrote :—

Most of the fruits of the *Labiata* do not differ very greatly in size or shape, and more or less similarity must be expected among those of the numerous species of *salvia* ; how many of those may agree in the colour of their epicarp and in the presence of the mucilaginous epithelium it is impossible at the present time to say. But I think it must be concluded that at least several species have fruits resembling in appearance very small ricinus seeds, and that most likely such of them which are mucilaginous have been used by the aborigines under the name of *chia*, which would, therefore, have to be regarded as a generic term, applicable to all fruits of *salvias* having the characters indicated.

Seeds of Indian species of *Salvia* may be put to the same uses as those of Mexico and California.

1002. *Nepeta elliptica*, Royle, H.F.B.I., IV. 658.

Vern.—Tukm malangá (Pb.).

Habitat.—Western Temperate Himalaya, from Kashmir to Kumaon.

Herbs often flexuous, ascending, densely hairy. Stem 1-2ft., woolly branched. Leaves subsessile elliptic-oblong or obcordate, tip rounded or acute, pectinately crenate, $\frac{1}{2}$ -lin., tomentose. Whorls sessile, crowded in terminal spikes. Spikes 3in. long, slender, often interrupted at base ; bracts ovate or lanceolate, awned ; calyx sessile $\frac{1}{4}$ in., teeth filiform ciliate, as long as the tube ; flowers about $\frac{1}{2}$ in. long, pale-blue, nearly white (Collett). Corolla-tube hardly longer than the Calyx.

Use.—One dram of seeds infused in cold water, used in dysentery.

1003. *N. ciliaris*, Benth., H.F.B.I., IV. 661.

Vern.—Zúfa zâbis (Pb.) ; Joofa (Sind).

Habitat.—Western Temperate Himalaya, from Kashmir to Garhwal.

Herbs tall, erect, branched, softly densely tomentose ; stem

2-3ft. Leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ in., sometimes almost as broad, lower floral large; shortly petioled, ovate-cordate, obtuse-crenate. Spikes 4-8in., pale; whorls secund dense-fid, in long interrupted villous spikes, upper crowded. Bracts lanceolate, often tinged with purple. Flowers $\frac{1}{3}$ in. long, lilac. Calyx $\frac{1}{4}$ in. curved villous, hairs long; teeth linear lanceolate, shorter than the tube often tinged with purple. Corolla very small, about one-third inch lilac, hairy, tube slender, longer than calyx (Collett). Nutlets broadly ellipsoid. J. D. Hooker says the plant is very like *N. Ruderulis*, but the inflorescence is more simple, the whorls rarely peduncled. Benthams describes the nutlets as minutely granular, but says Hooker that he finds them smooth.

Uses.—It is given in *sherbet* for fever and cough (Stewart).

1004. *N. ruderalis*, *Hamilt.*, H.F.B.I., IV. 661.

Syn.—*Glechoma*, erecta, *Roxb.* 460.

Vern.—Billi-lotan, Badranj boya, Bebrang khatai (Pb.); Niasbo (Nepal).

Habitat.—Tropical and Sub-tropical India, from the Indus to Behar, Central India and the Concan, ascending the Himalaya to 8,000ft.

Annual herbs, erect or ascending, finely pubescent or hoary, stem 6-18in., branched from the base, robust or slender, obtusely 4-angled. Leaves broadly ovate or orbicular-cordate, obtuse crenate, $\frac{1}{2}$ -2 $\frac{1}{2}$ in., green or hoary; petiole $\frac{1}{4}$ -1 $\frac{1}{4}$ in. Whorls $\frac{1}{2}$ -1in. diam., unilateral, depressed; peduncles lin. Flowers pedicelled, $\frac{1}{4}$ in. long, blue or purple, minutely darker dotted. Calyx hairy; teeth linear-lanceolate, shorter than the tube. Corolla pubescent, slightly longer than the calyx, $\frac{1}{4}$ in., purplish, says J. D. Hooker. "Calyx $\frac{1}{6}$ in., villous, mouth sub-equal, 3 upper teeth triangular, aristate, 2 lower filiform" (Hooker). Nutlets obscurely granulate, $\frac{1}{2}$ in. long, broad oblong, brown, spotted with white, mucilaginous when moistened. The granulation, says J. D. Hooker, consists of more or less tumid areolæ and is sometimes very distinct.

Uses.—Supposed to be cardiac tonic (Stewart). Decoction used as a gargle in sore-throat. Largely used in fevers (Dr.

Emerson). It is used by the Nepalese internally as a remedy for gonorrhœa (Buchanan.)

1005. *Dracocephalum moldavicum*, Linn., H.F.B.I., IV. 665.

Vern.—Tukhm-ferunjnishk (H.)

Habitat.—Western Temperate Himalaya and Kashmir.

An annual erect herb, quite glabrous. Stem 1-2ft., branched from the base. Leaves 1-2in., narrowed into a short slender petiole; lanceolate, obtusely deeply serrate or sub-pinnatifid. Spikes 4-8in., leafy; whorls distinct or distant. Flowers pedicelled, shorter than the floral leaves; bracts lanceolate, teeth long-awned. Calyx coriaceous, 2-lipped $\frac{1}{2}$ in., glabrous, upper lip broad, 3-toothed; upper teeth broadly ovate or mucronate. Corolla $\frac{3}{4}$ -lin., blue, tube greatly dilated at the throat. Stamens subexserted. Nutlets $\frac{1}{10}$ in., narrowly oblong, truncate.

Use.—The seeds are used ground up in fevers and as a demulcent: dose two drachms to half an ounce in infusion (Irvine).

1006. *Lallemantia Royleana*, Benth., H.F.B.I., IV. 667.

Vern.—Gharei kashmálú; Tukhm-malangá (H. and Pb.); Balungoo (Pb. and Kash.).

Habitat.—Punjab Plains and Hills; from Lahore westward.

The genus *Lallemantia* has the characters of *Dracocephalum*, but the upper lip of calyx with 3 obtuse lobes, of which the lateral are placed under the central (J. D. Hooker).

An erect annual, hoary-pubescent or glabrate, 6-18in., stem branched or single, obtusely angled. Leaves $\frac{1}{2}$ -lin., base cordate or narrowed into the petiole; ovate or oblong-obtuse, coarsely crenate. Bracts small, deciduous, oblong or lanceolate, teeth long-awned, whorls very numerous in long interrupted narrow spikes. Flowers shortly pedicelled. Calyx $\frac{1}{2}$ in., erect; Calyx-teeth pale-lilac; tube hardly exserted, limb small, stamens included. Nutlets $\frac{1}{10}$ in., narrowly oblong, smooth.

Use.—Seeds of this plant are used as cooling and sedative remedies (Stewart).

1007. *Crunella vulgaris*, Linn., H.F.B.I., IV. 670.

Vern.—Ustakhadús (Pb. and Sind.)

Habitat.—Temperate Himalaya, from Kashmir to Bhotan; Khasia Hills, Nilgiris and Travancore, and hilly districts throughout India.

A thinly hairy erect or ascending perennial herb, 4-12in. Rootstock creeping. Leaves 1-3in., upper sessile, the rest petioled, ovate or oblong, pinnatifid entire or toothed, acute or obtuse. Flowers $\frac{1}{2}$ - $\frac{3}{4}$ in. long, violet-purple, in whorls of 6, crowded in erect, terminal spikes. Floral leaves bract-like, hairy, purple margined, broadly ovate acute overlapping. Calyx tinged with purple, bell-shaped, 2-lipped; upper lip broad, 3-toothed; lower deeply 2-lobed; mouth closed after flowering time. Corolla-tube broad, slightly longer than the Calyx; limb 2-lipped; upper lip erect, wood-like, notched, lower spreading 3-lobed, mid-lobe largest, minutely toothed. Stamens 4, in unequal pair ascending under the upper lip; filaments bearing a small tooth below the anthers (Collett). "Corolla purple or white $\frac{1}{2}$ - $\frac{3}{4}$ in." (J. D. Hooker).

Uses.—Regarded by the Punjab Himalayan hill tribes as expectorant and antispasmodic. (Stewart). The green leaves smeared with castor oil and warmed over the fire applied externally to the anus in cases of painful piles.

1008. *Carrubium vulgare*, Linn., H.F.B.I., IV. 671.

Habitat.—Western Temperate Himalaya; and Kashmir.

A perennial tall robust shortly woolly herb. Stem 2-4ft., leafy. Leaves ovate or orbicular, crenate, rugose, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. diam., base rounded or cordate or cuneate, leathery, wrinkled. Petiole $\frac{1}{4}$ - $\frac{1}{2}$ in. Whorls depressed, villous, axillary, many and dense-fid. Flowers small. Calyx $\frac{1}{2}$ - $\frac{3}{4}$ coriaceous. Calyx-teeth 10, subulate, spreading and re-curved at the lip, throat woolly; corolla $\frac{1}{2}$ in., white, tube slender, upper lip long, 2-fid. Nutlets 1/12in., smooth.

Uses:—It is a well known old domestic remedy for coughs and other pectoral complaints, but is now seldom used in medicine by regular practitioners. In large doses it acts as a laxative and diuretic; in small doses, as a tonic and stimulant. An infusion

of a handful of the leaves is a good remedy for coughs. Linnaeus records an instance in which salivation, caused by the use of mercurial medicines, was removed by the administration of this infusion after every other remedy had failed. The plant should be gathered when in flower (Sowerby's English Botany).

In America, it is generally used in catarrhal states of the air passages, over which it seems to have a soothing effect and is much employed in confectionery as an ingredient in "cough drops" (Potter's *Materia Medica*, p. 277).

In Mexico, a preparation made from the leaves of this is used for rheumatism. It is also added to mescal and applied as liniment for rheumatism.

A proximate analysis gave the following result:—

	Per cent.
Fat, wax and traces of volatile oil	2.05
Crystalline compound, soluble in ether	.48
Chlorophyl and fat	2.20
Resin and bitter compounds, soluble in absolute alcohol	1.94
Mucilage	4.94
Glucose	.67
Extractive, soluble in water	5.93
Albuminoids	4.48
Pectin and undetermined	5.93
Pararabin	2.30
Cellulose and lignin	37.48
Moisture	6.72
Ash	24.30
Loss	.49

The fat was soluble in hot 95 per cent. alcohol, and melted at 46° C. The wax was insoluble in this solvent, but dissolved in carbon bisulphide. The crystalline principle was extracted from the drug with stronger ether, and purified by repeated crystallization from hot 95 per cent. alcohol, with one or more treatments with animal charcoal. The crystals were insoluble in water and in solution of potassium hydrate, very sparingly soluble in boiling water and in cold alcohol. Soluble in hot 95 per cent. alcohol, also in ether and chloroform. They melted at 152° to 153° C. They were at first tasteless, but developed, when held on the tongue, a decided bitterness. The alcoholic solution was very bitter.

Sulphuric or nitric acid gave a dark-brown colour, hydrochloric acid produced no change and ferric chloride produced no change.

This principle reduced Fehling's solution slightly by boiling, without first being treated with an acid.

A small quantity of a bitter principle was extracted from the drug by absolute alcohol, along with the resin. This appeared to be different from the previous one extracted by ether.

These results point to the presence of two bitter principles besides marrubiin, which is in agreement with Hertel's statement, that after the separation of marrubiin the fluid extract appeared to be as bitter as before.

1009. *Anisomeles ovata*, Br. H.F.B.I., IV. 672.

Syn. :—*A. disticha*, Heyne. Roxb. 459.

Vern. :—Gopâli (Bomb).

Habitat :—Tropical and Sub-tropical India, from the Indus to Assam, ascending the Himalaya to 5,000 ft. and south to Travancore.

An erect hairy annual herb, 3-6ft., most variable in hairiness. Stems stout, acutely quadrangular, woolly-pubescent. Leaves $1\frac{1}{2}$ - $2\frac{1}{2}$ in., ovate, acute, deeply crenate serrate, softly pubescent on both sides. Petiole about 1in., hairy. Flowers nearly sessile, whorls dense axillary, distant below, but approximated above to form a dense spicate inflorescence. Bracts linear. Calyx-tube long campanulate, glandular and hairy, somewhat enlarged in fruit. Segments lanceolate, very acute, half as long as tube. Upper lip of Corolla oblong oval obtuse, lower lip with two middle lobes, large round deflexed, the lateral ones small. Stamens 4-unequal pair protruding from under the upper lip, outer or superior pair longer than the inner. Filaments with a tuft of long hairs in front. Nutlets $\frac{1}{8}$ in., hardly oblong, polished. Flowers white, the lower lobes of lip, pale pink violet. The leaves have a slightly camphor odour.

Use :—A distilled oil is prepared from it and found useful in uterine affections (Ph. Ind.). It has also carminative, astringent and tonic properties.

1010. *A. malabarica*, Br. H.F.B.I., IV. 673.

Syn. :—*Ajuga fruticosa*, Roxb. 458.

Vern. :—Pemayarutie (Tam.); Moga-beerakoo, mabheri,—china-ranabheri (Tel.); Gâozubân (Hind.); Chodhâra (Bombay); Mogbir-kâ-pattâ (Duk.); Pêyaverutti, irattai-pêy, marutti (Tam.); Moga-bira, maga-bira (Tel.); Pêyi-meratti, peruntûmba, karintûmba (Mal.).

Habitat :—Deccan Peninsula. Common in the Western Ghauts.

A shrubby annual herb, densely tomentose or thickly woolly, 4-6ft. Branches sometimes very stout and most densely clothed with somewhat adpressed wool. Leaves 2-6in., very thick, oblong, linear-oblong or oblong-lanceolate, obtuse, acute or acuminate, crenate or serrate; base cuneate, very rarely cordate. Petiole $\frac{1}{8}$ - $\frac{1}{2}$ in., very stout. Spikes sometimes very heavy with dense whorls, 2in. diam., densely woolly; bracts filiform, Calyx $\frac{1}{4}$ - $\frac{1}{3}$ in., villous or woolly; teeth narrow lanceolate, slender. Corolla purple. Nutlets pale.

Uses :—In Southern India, few plants are held in higher esteem, or are more frequently employed in native practice, than this. An infusion of the aromatic bitter leaves is in common use in affections of the stomach and bowels, catarrhal affections and intermittent fevers. According to Dr. Wight (*Illust.*, vol. ii, p. 221), in addition to its internal use in the cure of fevers, patients are made to inhale the vapour of a hot infusion so as to induce copious diaphoresis. An infusion of the leaves is reported by Dr. Æ Ross to be powerfully diaphoretic, and very useful in the low continued fevers of the natives. An oil obtained by distillation of the leaves is likewise stated to prove an effectual external application in rheumatism. The virtues of this plant seem worthy of further investigation (Ph. Ind.). "Ainslie tells us that an infusion of the leaves is given to children in colic, dyspepsia and fever arising from teething. A decoction of the plant, or the essential oil distilled from the leaves, is used externally in rheumatism" (Dymock).

1011. *Stachys parviflora*, Benth., H.F.B.I., IV. 677.

Vern. :—Kirimara; Baggibûti (Pb.); Speraghunai (Pushtu).

Habitat :—Punjab Plains and Hills, from the Jhelum eastwards and northwards to Murree.

Herbs densely clothed with flocculent white wool, branched from the base and upwards. Stem and branches very stout nearly terete. Leaves 1-3in., sessile, thick, elliptic oblong or oblong ovate, or lanceolate, sub-acute entire or serrate; floral far exceeding the flowers, glabrous and shining or cottony

above, upper woolly all over. Whorls distant, 2-4-fid. Calyx $\frac{1}{8}$ - $\frac{1}{6}$ in., densely woolly, cupular, teeth short, acute; fruiting closed over the nutlets with the teeth incurved. Corolla re-purple, lips very small, upper short, rounded. Nutlets enclosed in the ovoid or sub-globose calyx, usually 2, turgid, plano-convex, $\frac{1}{8}$ in. long, grey, granulate.

Use:—In the Salt Range the bruised stems are applied to the guinea-worm (Stewart).

1012. *Galeopsis Tetrahit*, Linn., H.F.B.I., IV. 677.

Habitat:—Sikkim Himalaya; Fields at Lachen, altitude 11-12,000ft.

A hispid annual. Stems 1-3ft.; hairs spreading and deflexed; Nodes very hispid, thickened. Leaves 1-4in., ovate or ovate-lanceolate, acute or acuminate, coarsely serrate. Calyx $\frac{1}{2}$ - $\frac{3}{4}$ in., teeth straight, equalling or exceeding the tube. Corolla $\frac{3}{4}$ -1 $\frac{1}{4}$ in., yellow and purple.

Use:—This plant deserves investigation.

Chemistry.—When the leaves are boiled with 1 per cent. hydro-chloric acid, their lower sides are covered with microscopic crystalline aggregates. Crystals of the same substance, scutellarin, separate when the aqueous extract of the leaves is acidified. It is found chiefly in the leaves.

Scutellarin, $C_{21}H_{20}O_{12}$, $2\frac{1}{2}$ H₂O, is prepared by extracting the leaves and flowers of the plant with ten times the quantity of water, and acidifying the extract with concentrated hydro-chloric acid, the yield is less than 1 per cent. The acid filtrate from the scutellarin contains cinuamic and fumaric acids. Scutellarin crystallises in pale-yellow needles, which darken at 200°, but do not melt at 310°. Lead acetate gives red precipitate with the alcoholic solution, and ferric chloride an intense green coloration which becomes red on heating. Oxidising agents (chlorine, water, etc.) give an immediate green colour. Alkalis, ammonia and alkali carbonates dissolve it with a deep yellow colour; these solutions reduce ammoniacal silver intrate and Fehling's solution; acids re-precipitate scutellarin. Concentrated sulphuric acid dissolves it with a yellow colour. From the solution or suspension in acetic acid, concentrated mineral acids throw down deep yellow or orange, crystalline salts. The acetyl derivative melts and decomposes at 267°. When fused with potash, *p*-hydroxy benzoic acid and a substance, which crystallises in large plates, are formed.

Under the action of 30-40 per cent. sulphuric acid, it is converted into *scutellarein*, $C_{15}H_{10}O_8$, which melts above 300°, dissolves in alkalis with a yellow colour, gives a reddish brown tint with ferric chloride, an emerald-green colour with baryta water, and a yellowish-red precipitate with lead acetate. When fused with potash, scutellarein yields *p*-hydroxy-benzoic

acid and phloroglucinol (?). Scutellarin and scutellarin both appear to be flavone derivatives. (J. Ch. S. 1902 A. I. 48.)

1013. *Leonurus sibiricus*, Linn., H.F.B.I., IV. 678 ; Roxb. 461.

Vern. :—Gúmâ (Patna).

An annual herb, 2-6 ft. high, glabrous or more or less pubescent. Stems bluntly 4-angled, sulcate. Leaves $1\frac{1}{2}$ -4 in. long, palmatipartite ; segments linear, incised, glabrous or nearly so on the upper surface, pale beneath and more or less pubescent on the prominent nerves, petioles up to 2 in. long. Floral leaves of upper whorls usually entire ; bracts $\frac{1}{2}$ in. long, spinescent. Calyx $\frac{1}{4}$ - $\frac{1}{2}$ in. long, glabrous or slightly pubescent ; teeth triangular, spine-tipped. Corolla red, up to $\frac{1}{2}$ in. long ; tube as long as the limb, annulate within ; upper lip hooded, hairy ; lower equaling the upper, the 2 lateral lobes rounded. Nutlets $\frac{1}{10}$ in. long. (Duthie.)

Habitat :—Plains of India, from Bengal and Sylhet to Coorg.

Use :—The root, leaves and juice are bitter and used as a febrifuge. Dose 2 drachms to 2 ounces in infusion, price 1 anna per pound (Irvine).

1014. *Roylea elegans*, Wall., H.F.B.I., IV. 679.

Syn. :—*Phlomis calycina*, Roxb. 462.

Vern. :—Patkaran (H.) ; Tit-patti, kauri (Kumaon) ; Kaur, kauri (Pb.).

Habitat :—Sub-tropical Western Himalaya, from Kashmir to Kumaon.

A tall hoary woody undershrub, much-branched, 3-5 ft. high. Branches slender terete, finely tomentose. Bark grey. Wood hard white. Leaves opposite, 1-2 in., long, ovate, crenately toothed, tomentose beneath, base cuneate. Petiole $\frac{1}{4}$ - $\frac{1}{2}$ in. Flowers in 6-10 flowered axillary whorls ; Calyx 5-lobed, 10-ribbed, rigid ; Fruiting Calyx $\frac{1}{2}$ - $\frac{3}{4}$ in., tube deeply ribbed, lobes as long. Corolla-tube narrow, $\frac{1}{2}$ in., white or pinkish 2-lipped ; upper lip erect, lower spreading. Stamens 4 ascending ; Stigma sub-equally 2-lipped. Nutlets $\frac{1}{8}$ in. long, obovoid oblong, smooth. The plant has the odour of lemons.

Use :—An infusion of the leaves is drunk for contusions produced by blows, and about Kumaon the same preparation is used as a bitter tonic and febrifuge. (Stewart).

1015. *Otostegia limbata*, Benth. Mss.; H.F.B.I., IV. 680.

Vern. :—Búi, phút-kanda, jandí, lana, kandiári, agzhan, awáni-búti (Pb.).

Habitat :—Punjab, lower hills, in rocky places, west of the Jhelum to the Salt Range.

A small grey, hoary spiny bush. Branches tomentose, white, terete. Spines $\frac{1}{2}$ – $\frac{3}{4}$ in. Leaves sub-sessile elliptic-lanceolate, obtuse or quite entire, nerveless lin., base narrowed, hoary on both surfaces, floral exceeding the calyces. Bracts lower spinescent, upper dilated pungent, whorls distant. Calyx villous, throat bearded, flowering $\frac{1}{2}$ in., turbinate with a broad membranous 5-toothed limb, which in fruit expands into a reticulated 5-angled cup, $\frac{2}{3}$ in. diam., with often toothed margins. Corolla $\frac{1}{2}$ in., tube short, upper lip very long, villous. Stamens exserted. Nutlets $\frac{1}{2}$ in., flattened, smooth.

Uses :—The juice of the leaves is applied to children's gums, and to ophthalmia in man and beast. (Stewart).

1016. *Leucas cephalotes*, Spreng., H.F.B.I., IV. 689.

Syn. :—Phlomis Cephalotes, Roth Roxb. 461.

Vern. :—Dhurpi ság (H.); Bara palkasá (B.); Audia dhurup arak (Santali); Kubi (Guz.); Pedda tumui, tum-ui (Tel); Kedari Tumba (Mar.). Phumián, sisaliús, maldoda, guldoda, chatra (Pb.);

Habitat :—Himalaya, from Simla to Bhotan. Plains from Chittagong and Assam to the Punjab, and south through the Deccan.

A tall stout scaberulous annual herb. Stem 2-3 ft., hairs spreading. Leaves membranous, more or less pubescent, 2-4 in., shortly-petioled ovate or ovate-lanceolate, sub-acute, crenate serrate; whorls 1-2 in. diam. very large-rounded by the imbricating membranous adpressed bracts; terminal whorls globose. Bracts elliptic or linear-lanceolate, awned. Calyx $\frac{3}{4}$ in., tubular slightly

curved, usually softly pubescent, membranous, hairs of mouth as long as the teeth ; teeth very short, subulate scabrid. Flowers lin. long, says Collett from Simla. Calyx hairy near the top, otherwise glabrous.

Uses :—The plant is officinal, being considered stimulant and diaphoretic (Stewart). The seeds yield an oil which is used medicinally by the Santals (Revd. A. Campbell). The fresh juice is used in certain localities as an external application in scabies. The flowers are administered in the form of a syrup as a domestic remedy for coughs and colds.

It is also used as a vegetable rennet.

1017. *L. zeylanica*, Br., H.F.B.I., IV. 689.

Vern. :—Gatta tumbá (Cingh.)

Habitat :—Assam ; Cachar ; Chittagong.

An erect annual, pubescent or hispidly hairy herb. Stem 1-3ft., branched above. Hairs spreading, deflexed or adpressed. Leaves 2-3in., sometimes lin. diam., linear or elliptic-lanceolate, obtuse, sub-serrate, shortly petioled. Whorls small, $\frac{1}{2}$ - $\frac{2}{3}$ in. diam., sub-terminal many-fid, rarely axillary. Bracts few, ciliate. Calyx very constant in size and shape, $\frac{1}{4}$ - $\frac{1}{2}$ in., obliquely turbinate glabrous, scabrid or sparsely hispid ; teeth minute, erect or spreading horizontally. Mouth broad pubescent within.

Uses :—The Cinghalese attribute miraculous powers to this plant. The leaves are bruised and a teaspoonful of the juice given, which is snuffed up by the natives as a remedy in snake-bites. The fresh juice is also employed in headache and colds (Long, Ind. Plants of Bengal). In Reunion, it is considered to be stimulant and antirheumatic.

Chem. com.—The herb of *L. zeylanica* on distillation afforded a very small quantity of essential oil. By boiling a decoction of the herb with soda solution a strong odour was given off, and on condensing the vapour, ammonia and a volatile alkaloid were detected in the distillate. The alkaloid was combined in the plant with an acid giving a green colour with ferric salts. The air-dried plant afforded 7.3 per cent. of ash (Pharmacog. Ind. III 124.).

1018. *L. aspera*, Spreng., H.F.B.I., IV. 690.

Syn. :—*Phlomis esculenta*, Roxb. 461.

Vern. :—Chota-pal-kúsa (H. and B.); Thurduri baji (Dec.); Tamba (Bomb.); Tumbai-chedi, Thombay-keerary (Tam.); Tumma-chettu, Tummi-kura (Tel.).

Habitat :—Plains of India, from Sikkim and Behar to the Punjab, and southward to Cape Comorin.

An erect or diffuse annual, very variable. Stem stout hispid or scabrid, erect, usually much diffusely branched from below. Branches 4-6 in., rather leafy, sometimes taller, with erect branches and larger leaves $\frac{2}{3}$ in. broad. Leaves 1-3 in. Inner or oblong, obtuse entire or crenate. Whorls large terminal and axillary, often lin. diam., very dense-fid and hispid. Bracts long, linear and filiform. Calyx variable, but with always the upper lip produced and with short triangular teeth, $\frac{1}{4}$ - $\frac{2}{3}$ in, tubular curved, smooth below, green and ribbed and scabrid above, contracted above the nutlets, mouth small, glabrous, very oblique, shortly irregularly toothed. Corolla small. The whole plant is fragrant and used as a potherb.

Use :—The juice of the leaves, according to Dr. J. Shortt, is applied successfully in psoriasis and other chronic skin eruptions. (Ph. Ind.). The leaves are said to be useful in chronic rheumatism (Dr. Meadows, in Watt's Dictionary.)

1019. *L. linifolia*, Spreng., H.F.B.I., IV. 690.

Syn. :—*Phlomis zeylanica*, Roxb. 461.

Sans. :—Dronapushpi, Rudrapushpa.

Vern. :—Hulkussa (B. and H.); Poo-alla-toomi (Tel.); Tumbai (Tam). Tumbe, Karjâli-gida (Kan.); Tumpa (Mal.); Dron (Assam); Gumi, Kumbha (Gond.); Goma (Deccan.)

Habitat :—Plains of India, from Assam, Bengal and Sylhet to Singapore. In the Deccan, from the Concan to Travancore.

An annual erect, smooth or scaberulous herb. Stem 2-3 ft., usually stout and much-branched above. Leaves 2-4 in., linear or linear-lanceolate, obtuse entire or subserrate, rarely $\frac{3}{4}$ in. broad. Petiole 0- $\frac{1}{2}$ in. Whorls axillary and terminal towards the ends of the branches, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam.; bracts few short, setaceous.

Calyx pale below, not striate above, toothing variable, sometimes spinescent, $\frac{1}{4}$ - $\frac{1}{3}$ in., obovoid, glabrous or puberulous, mouth very oblique, contracted, glabrous within upper lip, projecting, acute 3-toothed, lower 2-fid.

Use :—The natives of Central India believe that the leaves, when roasted and eaten with salt, have febrifugal properties (Duthie).

1020. *Leonotis nepetæfolia*, Br. H.F.B.I., IV. 691.

Syn. :—*Phlomis nepetæfolia*, Linn. Roxb. 461.

Vern. :—Hejur-chei (H.); Dare dhompo, janum dhompo (Santal); Mâti-jei, mâtisul (Guz.). Dipmal, Ekri. (Mar.); Rana bheri, beri, mulu golimidi, hanumanta bira (Tel.).

Habitat :—Throughout hotter India, from the Punjab to Travancore.

A tall, herbaceous annual 4-6ft. Stem as thick as the finger, 4-angled with concave faces, puberulous. Leaves 4-8 by 2-5 in., membranous ovate, crenate, floral lanceolate, deflexed. Bracts spinescent, winged, linear, deflexed. Petiole 1-3 in. winged above, slender. Whorls distinct, globose, 2-3 in. diam., squarrose. Calyx $\frac{1}{2}$ -1 in. ribbed and reticulate, pubescent or villous, tubular incurved; teeth spinescent, upper lip prominent rigid, $\frac{1}{4}$ in. long. Lower with three erect spinescent rigid teeth. Throat glabrous. Corolla orange-red, 1 in. long, tube slender, exserted, villous like the upper lip, lower lip minute. Nutlet linear-oblong, widening upward, truncate.

Uses :—In Chutia Nagpur, the ash produced by burning the flower-buds is applied to burns and scalds (Revd. A. Campbell). In Bombay, the ashes of the flower-heads mixed with curds is applied to ringworm and other itchy diseases of the skin. Dr. A. J. Amadeo states that it is called Rascamono in Porto-Rico, and that a decoction of the leaves is used as a tonic, the juice is also expressed and taken with limejuice and rum as a febrifuge. Dr. Amadeo has used it in combination with *Phyllanthus Niruri* in intermittents. (Dymock.)

1021. *Eremostachys Vicaryi*, Benth., H.F.B.I., IV. 695.

Vern:—Gurgunna; Khalátra; Rewand chini (Pb.).

Habitat:—Western Punjab, Peshawar, Salt Range, and Jhelum.

Erect herbs, stems 3-5ft., very stout, simple or branched. Leaves radical, 12-18in., ovate, pinnatisect; segments or pinnules sessile-glabrous, lower floral sessile oblong, lobulate, petiole strong, base woolly. Spikes 8-10in., rachis very stout. Whorls many-fid, at length distant. Calyx, $\frac{1}{2}$ in., campanulate, scurfily tomentose, mouth truncate, shortly 5-crenate, crenatures apiculate; galea of Corolla, says J. D. Hooker, villous and fringed with white hairs.

Use:—The seeds are given as a cooling medicine. (Stewart).

1022. *Ajuga bracteosa*, Wall., H.F.B.I., IV. 702.

Vern:—Kauri búti (Jhelum); Karku, nilkanthi (Sutlej); Khurbani (Trans-Indus). The bazar names are Jân-i-adam, mukund babri, nilkanthi. Mr Baden-Powell gives *jan-i-adam* as the vernacular of *Ajuga reptans*, a European species, and Stewart further gives that name to *Salvia lanata*.

Habitat:—Western Himalaya, from Kashmir to Nepal, and in the plains near them from Oudh to Peshawar.

Softly hairy herbs. Stems erect or ascending, many from the rootstock, branching usually diffusely from the base, 4-12in., simple or divided, usually stout, leafy, softly pubescent, villous or glabrate, rarely substrigose or hispid. Branches terete or ascending. Leaves 1-4in.; lower petioled, upper sessile, sinuate-toothed or nearly entire, oblanceolate or sub-spathulate, whorls axillary and crowded in spikes, much shorter than the leafy ovate or cuneate-obovate, entire or toothed bracts. Calyx $\frac{1}{2}$ in. villous; Calyx-teeth ovate-lanceolate. Corolla pale blue or lilac, pubescent; tube rarely twice as long as the Calyx; upper lip erect, 2-fid; side lobes or lower oblong, midlobe dilated, variable in length, stamens protruding from the upper lip. Nutlets $\frac{1}{2}$ in., ellipsoid, deeply rugosely fitted.

Uses:—Jan-i-adam is described as a bitter astringent, nearly

inodorus; sometimes substituted for Cinchona in the treatment of fevers (Baden Powell).

Mukand babri.—On the Salt Range it is used to kill lice, and is regarded as depurative (Stewart); an aromatic tonic, specially useful in ague (Baden-Powell).

"There appears to be some confusion as to the identification of the medicinal products sold in the bazars of the Punjab and North-West Provinces, under the names of Jân-i-adam and Mukand babri. Specimens and further information should therefore be obtained" (Watt).

The leaves of the species of *Ajuga* have a peculiar resinous odor and a bitter taste. They are said to be stimulant, diuretic and aperient. They have been given in rheumatism, gout, palsy and amenorrhea. (U. S. Disp.)

N. O. PLANTAGINEÆ.

1023. *Plantago major*, Linn., H.F.B.I., IV. 705.

Syn.—*P. asiatica*, Linn.

Vern.:—Luhuriza (H.); Gul, isuf gol (isupgul) is *P. ovata*, for which see further (K. R. K.)

Habitat:—Temperate and Alpine Himalaya, from Peshawar and Kashmir to Bhotan. Assam, Khasia Hills, Bombay and Nilghiris.

Perennial scapigerous herbs, glabrous or hairy. Rootstock stout, truncate. Leaves all radical, 2-5in., variable in breadth, teething irregular, oblong, or oblong-ovate, subentire at times, 3-7-ribbed. Petiole sometimes 4in. Spikes 3-4in., very long and slender. Flowers scattered or crowded; bracts equalling the Calyx. Sepals glabrous, $\frac{1}{2}$ in. long, margins broadly scarious, obtusely keeled. Corolla glabrous; filaments short. Capsule 2-celled, cells 4-8-seeded. Seeds angular, very minute, black.

Uses:—In Lahoul (Himalayas) the leaves are applied to bruises. (Stewart.)

The seeds have the same properties ascribed to them as those of *P. ovata*, being considered an efficient remedy in dysentery, stimulant, warm and tonic.

The root and leaves possess slightly bitter and astringent qualities and were formerly much used as a febrifuge. They are still employed as a domestic remedy in England, and in Tuscany a decoction of the leaves is believed to form an excellent eye wash, and to have styptic properties. The seeds are used as diuretic in China.

Contains a fair proportion of sugar and oxalic acid; whilst in the leaves of the plant, T. Koller found albumen, pectin, with citric and oxalic acids, J. Ch. I. 1887 P, 49

1024. *P. Lanceolata*, Linn., H.F.B.I., IV. 706.

Vern. :—Baltanga (H.); Baltung, bartung (B); Parhar pangri, parbar pangi, bartang (Pushtu).

Habitat :—Western Himalaya, from Kashmir to Simla, the Salt Range and Waziristan.

Perennial scapegerous herbs, very variable in size. Root-stock tapering. Leaves all radical, shortly petioled 1-12in., lanceolate, entire or toothed, 3-5-ribbed, woolly. Scape as long as the leaf, deeply furrowed. Spikes very short, $\frac{1}{2}$ -3in, ovoid subglobose or cylindric; bracts acuminate. Sepals usually ciliate, corolla glabrous; filaments long. Capsule 2-celled; cells 1-2-seeded.

Uses :—The leaves are used as an application to wounds, inflamed surfaces and sores. The seeds are used with sugar as a drastic purgative. Said to act as a hæmostatic. (Ph. J., 24th Feb, 1883. p. 683.)

1025. *P. brachyphylla*, Edg., H.F.B.I. IV. 706.

Vern. :—Parhar pangi (Pushtu).

Habitat :—Western Himalaya, from Kumaon to Kashmir; Western Tibet, and Afghanistan.

Perennial glabrous herbs. Leaves elliptic ovate, subsessile or petioled, 3-5-ribbed, axils glabrous. Scapes stout, glabrous, larger than the leaves and cylindric spikes. Much resembling a smaller state of *P. Major*, but the seeds are 1-2in, each cell, oblong and plano-convex.

Use :—The leaves, slightly bruised, are, in Ziarat, used as an application to wounds. (Lace, in Watt's Dic.)

1026. *P. amplexicaulis*, Cav., H.F.B.I. IV. 706.

Vern. :—Gajpipali, isafgol, spighwal (Pb.).

Habitat :—Panjab Plains, from the Sutlej westwards. Malwa, Sindh on the Boogta Hills.

An annual or perennial herb, stemless or subcaulescent, sparsely hairy a subglabrescent, branched from the base 2-4 in. high, bearing axillary leaves and scapes. Leaves long, very narrowly lanceolate, finely acuminate 3-nerved, base sheathing. Scapes very numerous, stout, glabrous, axillary. Spikes ovoid $\frac{1}{2}$ -1 $\frac{1}{2}$ in. Flowers large. Bracts cupular, glabrous, membranous, except the green rib. Sepals rounded, outer with a green keel, inner all membranous. Corolla-lobes ovate, acute. Seeds $\frac{1}{8}$ in., boatshaped, brown. Septum $\frac{1}{8}$ - $\frac{1}{4}$ in., oblong thickened, black,

Uses :—Said to be an astringent, useful in intermittent fever, and as an application to the eyes in ophthalmia; also used as an antidote for sanke-bite; highly valuable in pulmonary affections. (Ainslie.)

1027. *P. ovata*, Forsk., H.F.B.I., IV. 707.

Syn. :—*P. Ispaghula*, Roxb. 135.

Vern. :—Isabgol (H.); Isabgul (B.); Spungar (Sind); Isapgul (M.). Esopgol, uthamu-jirun Guz.; Iskolvirai (Tan.); Isabagāla vittulu (Tel.); Isabagolu, Visamagolu (Kan.).

The seeds are not mentioned by the old Hindu writers, but the Guzerati name appears to be of Sanskrit origin. In all the vernaculars, corruptions of the Persian name, *Ispaghul*, are in use. This word is a compound of اسب "a horse," and گوش "the ear," in allusion to the shape of the seeds (Dymock.)

Habitat :—Punjab Plains and low Hills, from the Sutlej westwards; Sindh.

An annual, stemless or subcaulescent herb, sparsely or thickly villous. Stem rarely branched from the base. Leaves all radical. 3-9 in., rarely $\frac{1}{2}$ in. diam., usually 3-nerved, entire or distantly toothed, narrow-linear or filiform, finely acuminate. Scapes glabrous, pubescent, longer or shorter than the leaves. Spikes $\frac{1}{2}$ -1 $\frac{1}{2}$, ovoid a cylindric. Bracts with broad scarious margins, ovate, oblong, obtuse, glabrous. Corolla glabrous; lobes rounded, concave, obtuse. Sepals sub-similar, glabrous or pubescent. Capsule 2-celled, cell 1-seeded. Seeds cymbiform.

Uses:—Demulcent, and mildly astringent. The seeds have been found serviceable in febrile, catarrhal, and renal affections, but their chief use is in diarrhœa and dysentery. Moistened with water, they form a good emollient poultice.

The seeds yield to water a good deal of mucilage, and form a cooling demulcent drink which is prescribed in cases where emollients are required. A slight degree of astringency and some tonic property may be imparted to the seeds by application of a moderate degree of heat, and it is said that this remedy cures the chronic diarrhœa of European and native children on the failure of other medicines. (Bentley and Trimen.)

The crushed seeds made into a poultice with vinegar and oil are applied to rheumatic and gouty swellings. With the mucilage a cooling lotion for the head is made. Two to three drachms moistened with hot water and mixed with sugar are given in dysentery and irritation of the intestinal canal to procure an easy stool. The decoction is prescribed in cough. The roasted seeds have an astringent effect, and are useful in irritation of the bowels in children and in dysentery.

1028. *P. Psyllium*, Linn, H.F.B.I., iv. 707.

Habitat:—North-Western Punjab; Peshawar and South of Bannoo; Tarki, N. of Indus.

Scapigerous herbs, annual, erect, strict, glandular-pubescent. Stem leafy, 4-8 in. Leaves opposite, linear or linear-lanceolate, flat, obtuse, 1-1½ in., with fascicles in their axils, hence appearing whorled; margin entire, with a very few glandular tubercles; bases, ciliate. Peduncles in the upper axils. Scapes usually shorter than the leaves. Spikes ovoid, ½-¾ in.; bracts acute, lower elongate, hispid. Sepals oblong, subacute. Corolla very small.

Use:—The seeds are used like those of *P. Major*, Linn.

N. O. NYCTAGINÆ.

1029. *Boerhaavia diffusa*, Linn., H. F. B. I., IV 709 (a variety of *B. repens*), Roxb. 49.

Sans.:—Punarnavā; Sothaghni.

Vern.:—Sânt, Gadhâ pûrna, (H.); Punarnabâ, seveta punarnabâ (B.); Punarnavâ, khâparâ, ghetuli (Bomb.); Vakhâ khaparo, dholi sâturdi, moto satodo (Guj.); Punárnawn (Satodiputchee) (Cutch); Vasu (Mar.); Thikri-kâ-jhâr (Duk.); Nakbel (Sind); Mukaratte-kire, mukúkratt (Tam.); Ata!amámidi (Tel.); Itsit (Pb.); Tamilama, talutâma, (Mal.); Sanadika, balevadakigida (Kan.).

Ha'itat:—Throughout India; from the Punjab to Assam and South to Travancore.

A diffusely branched herb; root stout, fusiform, rootstock woody. Stems 2-3ft. long, slender, prostrate or ascending, swollen at the nodes, minutely hairy and sometimes viscid or subglabrous, often tinged with purple. Leaves rather thick, arranged in unequal pairs at each node, $\frac{1}{2}$ -1 $\frac{1}{4}$ in. long, ovate oblong or sub-orbicular, green and glabrous above, usually white beneath; base rounded or subcordate, margins subundulate, often pink; petioles about as long as the blade. Flowers minute, subcapitate, 4-10 together in small bracteolate umbels forming slender long-stalked axillary and terminal panicles; bracteoles lanceolate, acute. Perianth $\frac{1}{2}$ in. long; tube glandular-hairy; limb red, funnel-shaped, with 5 narrow vertical bands outside. Stamens 2 or 3, slightly exserted. Fruit $\frac{1}{2}$ in. long, clavate, rounded, viscidly glandular on the 5 broad blunt ribs (*Duthie*).

Uses:—"It is used in jaundice, ascites, anasarca, scanty urine, and internal inflammations" (Dutt). In the Punjab, considered useful for the eyes (Ibbetson's Gujrat). In Goa, the herb is esteemed as a diuretic in gonorrhœa, in Bombay is much used for dropsical swellings (Dymock). The use of the root in gonorrhœa appears to have been introduced by the Portuguese; in the West Indies, the plant is known as Bejuco de purgacion, and is the popular remedy for that disease. The root used in bronchitic asthma. This has been confirmed by the experience of the French in the Antilles, where the plant is called Patagon or Patagonelle-Valeriane. Its diuretic properties have been borne testimony to by numerous medical officers. (Watt, 1. 486.)

"Assistant-Surgeon B. M. Chatterjee reports having found it a very good expectorant, and that he has prescribed it in several cases of asthma with marked success. He employed it in the form of powder, decoction, and infusion, but the doses and proportions are not furnished. Taken largely it acts as an emetic." (Ph. Ind.)

In *Food and Drugs* for October 1910, p. 80, Dr. Lal Mohan Ghoshal concludes his observations on the action of this plant as follows:—

1. "The active principle is a diuretic, chiefly acting on the glomeruli of the kidney through the heart, increasing the beat and strength, and raising the peripheral blood pressure in consequence; on the cells of the tubules it exerts little or no action and, if any, it is only initial and comparative.

2. On respiration it has little or no action, and if it is anything, it is probably due to the fatty principle found in the weeds.

3. On liver the action is principally secondary and in chemical combination with other drugs.

4. On other organs the drug has practically no effect.

From what has been gone through it may be inferred that the drug may be given in any condition of the kidney where there is lessened secretion or where increased secretion of kidney is wanted. Thus it may be given in all renal affections stopping secretion of kidney, in ascites, either from cirrhosis of liver or heart or kidney. As it increases the systole of the heart, it may be useful in all stenosed conditions of the valves, as by increasing the force and duration of the systole it can pump all the blood from the heart. Where there is dropsy and ascites due to weakness of the heart or to dilation of the heart, this medicine in my opinion may do extreme good by relieving the circulation through the kidney. In pleurisy and some such affections, where there is accumulation of fluid in the cavities, the drug may be useful by increasing the quantity of urine."

It contains (1) a sulphate of a body, alkaloidal in nature; (2) an oily amorphous mass of the nature of fat (probably); (3) sulphates and chlorides and traces of nitrates and chlorates from the ash. The amount of the alkaloidal body is very small. (*Food and Drugs*, Oct. 1910, p. 73.)

1030. *Pisonia aculeata*, Linn. H.F.B.I., IV. 711.
Roxb. 312.

Vern.:—Baghachura (Beng.); Hâti-âkusâ (Uriya); Karuindu (Tam.); Kunki-pootri, embudi chettu, konki (Tel.).

Habitat:—South Concan, and elsewhere in the Deccan Peninsula.

A large, woody, thorny, straggling or climbing shrub, often forming impenetrable thickets. "Young shoots and inflorescence pubescent armed with sharp axillary, more or less curved thorns" (Brandis). Bark light-brown, thin. Wood light brown, soft, of peculiar structure (Gamble). Trunk very short. Branches subopposite, horizontal. Leaves 2-3in., elliptic obtuse, entire, base cuneate, glabrous. Blade 2-3in.; petiole $\frac{1}{4}$ - $\frac{1}{2}$ in. long. Flowers greenish white in compact, sometimes paniculate, axillary cymes. Male flower campanulate, pedicelled, 5-toothed. Stamens 7-8. Female flower ovoid, obscurely toothed. Stigma lacerate. Fruit long-pedicelled, $\frac{1}{3}$ - $\frac{1}{2}$ in., narrowly oblong or clavate, 5-ribbed, ribs muricate, with several rows of glands (J. D. Hooker). The gland protuberances are viscid, says Brandis.

Uses:—The bark and the leaves are used as a counter-irritant for swellings and rheumatic pains (T. N. Mukherji). The juice mixed with pepper and other ingredients is given to children suffering from pulmonary complaints (Watt's Dict.).

1031. *P. alba*, Spanoghe. H.F.B.I., IV. 711.

Vern.:—Chinai Sâlit (Bomb.)

Habitat:—Cultivated in India.

An evergreen unarmed tree of middle size, 30-40ft., glabrous, except the youngest shoots and inflorescence. Leaves large, pale green or bright greenish yellow, those of the ends of the branches often nearly white, somewhat resembling the lettuce in taste, but is an "indifferent substitute" (Gamble). Eaten in Ceylon by the Singhalese (Trimen) and by the European-Jews of Bombay (K. R. K.). The male tree has much darker leaves and not much brown as the lighter leaved are in gardens in coast towns in India, as in Calcutta, Madras, Colombo and Bombay.

Leaves 6-10in., elliptic, oblong-ovate or oblong, acute or acuminate. Petiole $\frac{1}{2}$ -1 $\frac{1}{2}$ in. Flowers in dense corymbose terminal cymes. Male flowers $\frac{1}{4}$ in. long. tubular campanulate, pedicelled, 5-toothed, stamens 8. Female flower much smaller; stigma pedicellate. Fruit flower much smaller. Stigma pedicellate. Fruit $\frac{1}{2}$ - $\frac{3}{4}$ in. long, long-pedicelled, narrow club-shaped, 5-angled, angles with one row of prickles.

Use:—The fresh leaves, moistened with Eau-de-Cologne, are used to subdue inflammation of an elephantoid nature in the legs and other parts. (Sakharam Arjun.)

N. O. AMARANTACEÆ.

1032. *Celosia argentea*, Linn., H.F.B.I. IV. 714. Roxb. 228.

Vern.:—Debkoti, sufaid mûrgha, sarwari sirâli, ghogiya (H.); Sirgit arak (Santal); Salgâra, chilchil, sil, sarpankha (Pb.); Swet murgâ (B.); Sarwali, ucha-kukur (Sind.); Lâpadi (Guz.); Kudhu, kurdu (Bomb.); Kûrdû kurada (Mar.); Gurugu, pânche chettu (Tel.). (Several of these vernacular names imply white coxcomb).

Habitat:—Central and Northern India.

A glabrous erect annual herb, 1-3ft., stout slender, simple or branched. Leaves 1-6in., narrow, linear or lanceolate. Spikes solitary, few or many, 1-8 by $\frac{3}{4}$ -1in.; peduncles slender. Flowers $\frac{1}{8}$ - $\frac{1}{2}$ in., white, glistening; bracts much shorter than the acute sepals; style filiform. The top of the spike sometimes branches out in a coxcomb form.

Uses:—The seeds are officinal, being an efficacious remedy in diarrhœa. The Revd. A. Campbell says the Santals extract a medicinal oil from them. The amount of oil extracted by ether amounts to only about 7 per cent. The author of the *Muffaridat-i-Nâsiri* states that 180 grains of the seeds with an equal quantity of sugar-candy taken daily in a cup of milk is a most powerful aphrodisiac. (Dymock.)

1033. *C. Cristata*, Linn., H.F.B.I., IV. 715 ;
Roxb. 228.

Sans. :—Mayura Sikha.

Vern. :—Kokan, pīla-murghka, lāl-murghka (H.) ; Mawal, taji khoros, bostan afraz, kanju, dhurá-drā (Pb.) ; Lāl-murga, huldi-murga (B.) ; Erra-kodi-utta-tota-kuru ; Kodi-juttu-tota-kura (Tel.).

Habitat :—Throughout India, cultivated, and as an escape.

An annual erect glabrous herb. Stem tall, branching. Leaves ovate lanceolate, sometimes 9in. long and 3in. broad, sometimes varying from linea to ovate, acute or acuminate ; spikes cylindric, very stout. Flowers densely imbricate $\frac{1}{8}$ – $\frac{1}{4}$ in. Style filiform, lengthening after fruiting. Utricle acute ; dehiscence circumciss.

Uses :—The flowers are considered astringent, they are used in cases of diarrhœa, and in excessive menstrual discharges (Stewart.) The seeds are demulcent and useful in painful micturition, cough and dysentery. (U. C. Dutt.)

The seeds of *C. cristata*, Linn. afford a greenish-brown, drying oil, with an iodine value of 126.3. The insoluable fatty acids melt between 27° and 29°.

Regarding the genus *Amarantus*, Sir George Watt, in his *Comml. Prod. of India*, p. 62, writes—

"There may be said to be two or perhaps three distinct groups of amarantus that are of economic value to the people of India. These are the species cultivated in gardens and mainly, if not exclusively, as Pot-herbs : second, the wild species that are eaten as pot-herbs or Medicines : and third, the forms cultivated in fields and exclusively so as edible Grains. The last mentioned are by far the most valuable and hence may be taken up in greater detail than the others. But in passing it may be observed that the Indian species of this genus seem to be sadly wanting careful study and revision."

1034. *Amarantus spinosus*, Linn., H. F. B. I., IV. 718.

Sans. :—Tanduliya.

Vern. :—Kanta nutia (Beng.); Kante mat (Dec.); Mulluk-kirai (Tam.); *Mah* : Kánte bháji, kánte math Chanlai kánte-dár (H.); Mullan-chira (Malay); Mullu-tota-kura; Nalla doggali; Erra mulu goranta (Tel.).

Habitat :—Throughout India, in waste places, fields and gardens.

An annual erect glabrous herb. Stem 1-2ft., hard, terete, leaf-axils with 5 straight spines $\frac{2}{3}$ in. and under (J. D. Hooker). "Stem," writes Trimen (Ceylon), "polished, much-branched, cylindrical with a pair of very sharp divaricate opposite spines in leaf axils at the base of the bud or branch." This is what I find among the Konkan plants (K. R. Kirtikar). Leaves $1\frac{1}{2}$ -2 $\frac{1}{4}$ in., ovate-lanceolate, tapering to base, obtuse, spinous apiculate; entire undulate, glabrous above, slightly scurfy beneath, lateral veins numerous, prominent beneath, petiole $\frac{1}{2}$ -2 in. Flowers very numerous, sessile, pale green, clusters dense, both axillary and in terminal interrupted spikes, male fewer than female. Bracts linear, bristle-pointed. Perianth leaves 5, rather longer than bracts, ovate, bristle pointed. Stamens 5, spreading; ovary pointed, pubescent. Styles 2, long, spreading, hairy (Trimen). Utricle rugose, nearly equalling the sepals. Flowers $\frac{3}{4}$ in. long, sepals of male acuminate, of female obtuse apiculate. Stigmas 2. Seeds $\frac{3}{16}$ in. diam., blacky shining, border obtuse, not thickened. The plant varies from green to red and purple. (J. D. Hooker.)

Uses :—"Considered light, cooling and a promoter of the alvine and urinary discharges. Root said to be, according to Bhāvaprakash, useful in menorrhagia." (Dutt's, p. 221.) "Roots made into poultice are applied to buboes and abscesses for hastening suppuration." (Asst.-Surg. A. C. Mukerji.) The whole plant is used as an antidote for snake-poison, and the root as a specific for colic. It is also considered a lactagogue; and, boiled with pulses, is given to cows (I. P., p. 184). Assistant-Surgeon Amrita Lal Deb, of Howrah, recorded the root as a specific in gonorrhœa; also advocated its use in eczema (I. M. G., Nov. 1881).

1035. *A. paniculatus*, Linn., H.F.B.I., IV. 718.

Syn. :—*A. frumentaceus*, Ham. Roxb. 663. *A. Anacardana*, Ham. *A. farinaceus*, Roxb.

Vern. :—Chuko, Bathu (B.); Rajagaro (Guz.); Rājgira (Dec.); Tāj-e-khurus; Bustan afroz (Persian); Chúa mársa, ganhar. (H.); Kahola-bháji (Bomb.).

Habitat :—Cultivated throughout India and up to 9,000 ft. in the Himalayas.

A tall robust annual. Stem 4-5ft., striate, sometimes thicker than the thumb, glabrous or puberulous. Leaves 2-6 by 1-3in., elliptic or ovate-lanceolate, acute or finely acuminate, base cuneate, petiole as long as the leaf. Spikes sub-erect, red, green or yellow, in dense thyrses squarrose from the long curved bracts, centre one longest. Bracts acicular, recurved, very much longer than the oblong-lanceolate acuminate sepals. Sepals 5. Stamens 5. Utricle circumsciss, top 2-3 fid. Seeds $\frac{1}{20}$ in. diam., yellowish white or pitchy black with a narrow thin border.

Uses :—Used for purifying the blood and in piles, and as a diuretic in strangury. (Baden-Powell.) Used in scrofula and as a local application for scrofulous sores; administered in the form of a liquid. (Watt.)

Sir George Watt, in his *Comml. Prod. Ind.* (pp. 63-64), writes—

It is one of the most important sources of Food with the hill tribes of India, and there are both golden-yellow and bright purple conditions. The former is more frequent and seems therefore to be preferred; most fields, however, contain a few red plants among the yellow. It is an exceedingly ornamental crop: the hillsides on account of the fields of this plant, become in autumn literally golden-yellow and purple."

"The grain has been analysed by Church (*Food-Grains of Ind.*, 107-9) and the average of three samples gave the nutrient ratio at 1:5.3 and the nutrient value 90. It has been estimated that one plant will produce 100,000 grains. Speaking of another sample, which Church attributed to *A. gangeticus*, but which may possibly have been one of them any forms of the present species, he remarks: "The analysis shows that we have in these seeds a food in which the proportions, not merely of albuminoids of total starch plus the starch-equivalent of the oil, but also of the oil itself, are very nearly those of an ideal or standard ratio." Visitors to the hills of India are inclined to smile at people who live very largely upon these minute grains, but they might with advantage to themselves use this extremely wholesome article of diet.

1036. *A. gangeticus*, Linn., *Var. angustifolia*.
H.F.B.I., IV. 719; Roxb. 662.

Vern.:—Báns-patá-natiya (B.); Máti chulai (Bomb.); Lálság, chulái-ság, labra (Merwara).

Habitat:—Cultivated throughout India.

An erect glabrous annual herb, stout handsome species, much cultivated, 2-3ft., leafy green, pink, rufuse liver-coloured or bright-red. Leaves 2-5in., very variable from linear-lanceolate, to rounded-oval and 3in., diam. or deltoid ovate; tip rounded or long and slender, but always obtuse and often notched, base elongate cuneate. Petiole equalling the blade. Clusters squarrose, crowded in the lower axils and forming a terminal spike; bracts $\frac{1}{2}$ in. long. Bracts awned subulate, equalling or exceeding the 3 lanceolate sepals and utricle. Stamens 3. Utricle circumciss. Seeds lenticular, pitch-black, $\frac{1}{10}$ in. diam., border acute.

Use:—Used as an emollient poultice.

1037. *Æruea javanica*, Juss., H.F.B.I., IV. 727.

Syn.:—*Achyranthes incana*, Roxb. 225.

Habitat:—From the Oudh Terai to the Punjab, Sindh, and Central India. The Deccan, from the Concan southward.

A semi-shrubby plant. Stem 2-3ft., branched, cylindric, covered with a thick coat of very dense stellate wool which is easily detached. Leaves nearly sessile alternate, 1-1 $\frac{1}{2}$ in., linear-oblong or oblong-spathulate, rounded, slightly emarginate or acute, with dense woolly coat like the stem. Flowers white, sessile, uni-sexual, arranged in naked terminal panicles. Bracts large, broadly ovate, acute, papery, veinless. Perianth leaves 5, rather unequal, lanceolate or oval, papery, densely covered outside with long woolly hair, stigmas 2, long. Seed lenticular, black polished (Trimen); style elongate; flowers $\frac{1}{10}$ in. (J. D. Hooker.) Male flowers are said to be few.

1038. *Æ. lanata*, Juss., H.F.B.I., IV. 728.

Syn.:—*Achyranthes lanata*, Linn. Roxb. 227.

Sans.:—Astmayayda.

Vern.:—Chaya (B.); Bhui (Raj.); Bui, jari (Sind); Búi-kallam (Pb.); Kul-ke-jar, khul (Duk.); Azmei, spirke, sassái

(Trans-Indus); Kapur-madhura (Mar.); Sirrú-púláy vayr (Tam.); Pindie-conda (Tel.).

Habitat :—Plains of Bengal, from Dacca and Behar westward to the Indus. The Concan, Central India and throughout the Deccan.

A very common perennial weed, often woody at base. Stems erect or prostrate, numerous, long, with slender branches, cylindrical, more or less cottony hairy. Leaves alternate, numerous, $\frac{3}{4}$ –1½ in. on main stem, much smaller, $\frac{1}{4}$ – $\frac{3}{8}$ in., on branches, oval or spatulate-oval, tapering at base, rounded or sub-acute at apex, entire, finely hairy-pubescent above, more or less white with cottony hair beneath. Petiole short, obscure. Flowers very small, sessile, often bisexual, greenish white, in very small, dense, sessile axillary heads or spikes. Bracts shorter than sepals, ovate, obtuse, with membranous margins woolly with long white hairs outside. Stigmas 2, very short.

Uses :—The flowering tops of the above two species are official, and the roots are used in the treatment of headache, and by the natives of the Malabar Coast are regarded as demulcent.

1039. *Achyranthes aspera*, Linn., H.F.B.I., IV. 730; Roxb. 226.

Sans. :—Apámárga, ágháta, apangaka.

Vern. :—Apáng (Beng. and Ass.); Látjirá, chirchira, chirchitta (H.); Agháda (Bom. and Mah.); Uttaréni, antisha, apa márgamu (Tel.); Náyurivi (Tam.); Kutri, phut kanda (Gujrat); Kataláti (Mal.); Utráni-gida uttaráne (Kan.); Aghedo (Guj.); Margia (Sind.)

Eng. :—The Prickly Chaff-flower.

Habitat :—A shrub found all over India, ascending to 3,000 ft.

Annual herbs. (Stems 1-2 ft., erect, stiff, with long spreading branches thickened above nodes, striate, pubescent. Leaves few, usually thick, leathery, broadly ovate or orbicular, 3-5 by 2-3 in., tapering to base, usually rounded, on short petioles, sometimes acute, or apex entire, but often very undulate, very finely and

softly pubescent both sides. Flowers in robust woolly pubescent spikes upto 18in. long, numerous, stiffly reflexed against rachis, densely crowded. Bracts short, reflexed, ovate, membranous, with a long very acute point; bractlets very sharply spinescent (very hard in fruit), with a broad membranous wing at base. Perianth-leaves about $\frac{1}{2}$ in., oblong-oval, acute, glabrous and shining, with a narrow white membranous margin. Stamens 5, staminodes, large, truncate, fimbriate. Fruit very small, oblong cylindrical, truncate, nearly smooth, brown, enclosed in a hard perianth.

A very common weed throughout the Tropics in India, Ceylon, in waste land and in grass. Trimen observes that the perianth containing the fruit disarticulates from the rachis above the bract carrying away with it the spinescent bractlets by which it becomes attached to other objects and is transported. Flowers greenish white.

Uses :—It possesses valuable medicinal properties as a pungent and laxative, and is considered useful in dropsy, piles, boils, eruptions of the skin, etc. The seeds and leaves are considered emetic, and are useful in hydrophobia and snake-bites. (T. N. Mukerji's Amsterdam Catalogue.) The dried plant is given to children for colic and also as an astringent in gonorrhoea. (Stewart's Punjab Plants.) Major Madden says that the flowering spikes are regarded as a protective against scorpions, the insects being paralysed through the presence of a twig. The ash yields a large quantity of potash, rendering it useful in the arts as well as in medicine. Mixed with orpiment this ash is used externally in the treatment of ulcers, and of warts on the penis and other parts of the body. (U. C. Dutt.) Sesamum oil and the ash (*apamarga taila*) are used in the treatment of disease of the ear, being poured into the meatus. Dr. Bidie says: "Various English practitioners agree as to its marked diuretic properties in the form of a decoction." Dr. Cornish reports favourably, having found it efficacious in the treatment of dropsy. Dr. Shortt reports on its use as an external applicant in the treatment of the bites of insects; and Dr. Turner calls attention to it as a remedy

in snake-bite. (Pharm. Indica.) Used in cases of abscess; its ashes are used in cases of asthma and cough. (Ibbetson's Gujrat). In Sind, it is used by the native foresters as an application to wounds caused by Babool thorns (Murray, p. 101). To an infusion of the root is ascribed a mild astringent virtue (Honigberger, Vol. II., p. 222). The flowering spike made into pills with a little sugar is a popular preventive medicine in Behar for persons bitten by rabid dogs. (Balfour.) As an ash, however, there seems no reason to think it possesses any virtues other than those of the simple alkali of our shops.

"The drug may be useful in all conditions arising from nervousness. Thus it is used as a talisman in hysteria, and I know personally of cases that were benefited by it. How it acts in such a way, I cannot say; it may be possible that the good effects are obtained by ionisation only, if anything of such nature there is in the drug. But that it is undoubtedly useful in hysteria and such nervous disorders, there is no gainsaying. In hysteria what we find is that there is extreme nervous sensibility attended with muscular contraction, either violent or mild; it is preceded generally by irregular heart or palpitation" (Dr. Lal Mohan Ghoshal, in 'Food and Drugs' for Oct. 1912 pp. 84-85.)

1040. *Alternanthera sessilis*, Br., H.F.B.I., IV. 731.

Syn. :—*Achyranthes triandra*, Roxb. 227.

Vern. :—Moku-nú-wanna (Singh.); Ghardughi (Rohilkhand); kánchari (Bomb.).

Habitat :—Throughout hotter India in damp places, ascending the Himalaya to 4,000 ft.

A prostrate or ascending, nearly glabrous, herb, branching from base, 6-18 in. Leaves opposite, nearly sessile, narrowly oblong or ovate, 1-3 in., obtuse. Flowers minute, white, crowded in shining, very short head-like sessile axillary spikes. Perianth scarious 5-parted; segments acute. Stamens 5, the alternate ones sometimes without anthers; filaments united at base; anthers 1-celled. Ovary ovoid, notched at top; style very short, stigma capitate. Fruit a dry, flattened utricle, enclosed by the perianth and containing a single seed.

Use :—It is largely eaten in Ceylon as a vegetable, especially by mothers to increase the flow of milk ; also used as a wash for the eyes. (Watt.)

N. O. CHENOPODIACEÆ.

1041. *Chenopodium album*, Moq., H.F.B.I., V. 3, Roxb. 260.

Syn. :—*C. viride*, Linn.

Sans :—Vastuk.

Vern. :—Bathu sâg or bathuâ sâk, chandan betu (B. Bathûa, bâthû, jansâg, lunak (Pb.) ; Bethuâ, charâi, jansâg, H.) ; Bhatua, arak' (Santal ; Châkwat, ghânen, (Bomb.) ; Jhil (Sind) ; Khuljeh ke baji (Duk) ; Parupu kire (Tam.) ; Pappu kura (Tel.).

Eng. :—The white goose-foot.

Habitat :—Common throughout India.

Erect or ascending, scentless herbs, mealy or green. Stems 1-10ft., rarely slender or decumbent, angled, often striped green, red or purple. Leaves extremely variable in the cultivated forms, 4-6in. long, with petiole sometimes as long or longer ; rhombic, deltoid, or lanceolate, acute or obtuse, entire, toothed or irregularly lobulate, upper narrower, more entire. Clusters in compact or lax panicles ; spikes, which in cultivated forms become thyrsoid. Sepals 5, herbaceous (not succulent in fruit). Seeds very vertical. Forms vary from green to red.

Use :—Considered laxative and recommended for use by Sanskrit writers in the form of pot herb in piles. (U. C. Dutt.)

Chemical investigation of the composition of Chenopodium oil.

There is a pronounced increase in specific gravity and decrease in optical rotation after samples have been kept for a year at the ordinary temperature. For example, in the case of one oil with a specific gravity of 0.9700 and a $D = -6.20$, at 25°C , the corresponding values after a year were sp. gr. 0.9804 and a $D = -5.5^{\circ}$. When the oil was kept in a refrigerator these changes were less pronounced. The formation of the glycol produced on hydrating ascaridol with ferrous sulphate has been found to correspond to the same re-arrangement of the molecule which takes place when ascaridol is heated. In addition to this glycol, two other crystalline products were also formed. One of these, termed B-glycol, melted in the anhydrous state at 103°

105°C. It crystallised with one mol. of water and had the composition $C_{10}H_{18}O_3 + H_2O$. When warmed with dilute sulphuric acid it was decomposed, with the formation of thymol. The other new body was an erythritol, melting at 128° to 131°C., after drying *in vacuo*, and having the composition $C_{10}H_{20}O_4 + H_2O$. When boiled with dilute sulphuric acid, it was decomposed, the products of decomposition including a ketone with a strong odour of menthone, and a crystalline phenolic substance, melting at 80° to 81°C. The formation of more than one glycol by the hydration of the re-arrangement product of ascaridol may be explained by adopting the view of Wallach, whose results indicate that ascaridol is a 1—4- and not a 3—6-peroxide. Oxidation of the erythritol yielded an acid, $C_{10}H_{18}O_6$, which was regarded as one of the modifications of a *d*-methylisopropyl *d*-dihydroxyadipic acid differing in its properties from the two modifications previously described by Wallach. Oxidation of the α -glycol yielded an acid agreeing in its reactions with the structure of 1—4 cineolic acid (J. Ch. I. April 15th, 1913, p. 379.)

1042. *C. Cotrys*, Linn., H.F.B.I., V. 4.

Eng. :—The Jerusalem Dak.

Habitat :—Temperate Himalaya, from Kashmir to Sikkim ; Peshawar and Bombay. A weed in fields.

Very aromatic, erect, glandular, pubescent herbs. Stem grooved and ribbed, 6-18ft., stout, slender. Branches spreading and recurved. Leaves 1-3in., very obtuse ; lower leaves petioled, ovate-oblong, deeply sinuate, or lobulate, upper oblanceolate, more entire. Petals variable. Cymes spreading and recurved, short, branched. Flowers solitary or clustered, minute. Embryo incompletely annular.

Use :—It has been used in France with advantage in catarrh and humoral asthma. The officinal preparation is an oil (U. S. Dispensatory.)

Used as a substitute for *C. anthelminticum*, and to possess the same properties as those of *C. ambrosioides*. (Watt, II. 267.)

1043. *C. Ambrosioides*, Linn., H.F.B.I., V. 4.

Eng. :—The sweet pig-weed ; Mexican Tea.

Vern. :—Chandan batavá ; Vasuki (Bomb.).

Habitat :—Bengal, Sylhet and the Deccan.

A strongly aromatic glandular rank herb, erect, puberulous. Branches numerous, strict. Leaves shortly petioled, oblong or lanceolate-obtuse, sinuate toothed, upper entire, clusters in

slender axillary and terminal long slender simple or paniced spikes of small clusters. Sepals closing the utricle. Seed horizontal, smooth, shining; margin horizontal. Wight remarks that the flowers are polygamous at Coimbatore. (J. D. Hooker.)

Uses :—This is said to afford an essential oil to which the tonic and antispasmodic properties of the plant are attributed. It is commonly reported that this plant is used as a substitute for the officinal *C. Anthelminticum*, having in a milder degree the anthelmintic properties of that plant. It is employed in pectoral complaints and enjoys the European reputation as a useful remedy in nervous affections, particularly chorea. Officinal preparation an infusion. It is remarkable that the properties of this plant should be practically unknown to the people of India. (Watt. II. 267.)

1044. *Beta vulgaris*, Linn., H.F.B.I., V. 5.

Syn. :—*B. benghalensis*, Roxb. 260.

Vern. :—Bit palang (B.); Lebleboo (Pb.); Pālak (H.).

Habitat :—Largely cultivated in Bengal and Upper India.

A succulent annual or perennial glabrous herb. Stem 1-3ft., erect, furrowed. Lower or root leaves ovate or oblong-obtuse, often trowel-shaped, base cuneate or cordate, decurrent on the petiole, margin waved, upper or cauline, short incurved, rhombic-ovate, oblong-ovate or lanceolate. Flowers 2-sexual, sessile, solitary or 2-3-adsate, in axillary spiked or cymose clusters. Spikes 6-18in., slender; clusters remote. Bracts narrow, acute. Perianth urceolate, 5-lobed, covering in fruit by their enlarged hardened bases. Sepals oblong-obtuse, with membranous margins, thickened at base in fruit. Ovary depressed, sunk in the fleshy annular disk. Style short, Stigmas 2-4-subulate. Utricle adsate to the disk and base of perianth. Seed horizontal, testa thin, albumen floury, Embryo annular.

Use :—The seeds have cooling and diaphoretic properties. Bellew says that the fresh leaves are applied to burns and bruises. (Watt.)

The ethereal extract of the dry matter of the common mangel was examined and found to contain triglycerides, free fatty acids, and two neutral subs-

tances. The free and combined fatty acids consisted largely of palmitic, oleic, and erucic acids, while the two neutral substances were of phytosterol nature, and gave results on analysis corresponding with the empirical formulæ $C_{31}H_{53}O_2$ and $C_{29}H_{45}O_2$ respectively. (J. Ch. I. 31. 5. 1912, p. 501.)

1045. *Spinacia oleracea*, Linn., H.F.B.I., V. 6.

Syn.:—*S. tetrandra*, Roxb. 718.

Vern.:—Palak (H.); Palang (Beng.); Isfanaj Vusaleykiray (Tam.); Dum-pa-bachchali, mattur bachchali (Tel.); Pālak bhāji (M.).

Habitat:—Cultivated throughout India.

Annual deltoid, ovate, acuminate, acutely broadly pinnatifidly lobed, erect herbs. Leaves attenuate. Flowers dioecious, ebracteate, males in terminal leafless spikes; females in axillary clusters. Male:—Sepals 4-5, herbaceous, simple. Stamens 4-5, filaments capillary. Female:—perianth sub. globose, 2-4-toothed. Fruiting perianth free, 2-spinous. Fruiting enclosing the Utricle, coriaceous, unarmed or with 2-3 dorsal spines. Stigmas long, filiform, connate below. Utricle hard, compressed, adnate to the perianth. Seed vertical, testa thin, albumen floury. Embryo annular.

Use:—The seeds are laxative and cooling and useful in difficult breathing, inflammation of the liver, and in jaundice. (Taleef Sherif). They yield a fatty oil. The green plant is believed to be useful in urinary calculi. (Sakharam Arjun.)

Regarding its chemical composition, the authors of the *Pharmacog. Ind.* write:—

Chem. comp.—Besides a large quantity of mucilage, spinach contains so large a proportion of nitrates, that the water in which it has been boiled may be used for making touch-paper. The following figures give the mean percentage composition of three samples of spinach recorded by König:—

Water	...	...	...	...	88.47
Nitrogenous matter	...	...	...	...	3.49
Fat	...	...	...	...	0.58
Sugar	...	...	...	...	0.10
Nitrogen-free extractive	...	...	...	...	4.34
Fibre	...	...	...	...	0.93
Ash	...	...	...	...	2.09

Anhydrous spinach contained, as the mean of three analyses of different samples,—

Nitrogen	...	...	...	...	4.94
Carbohydrates	...	...	...	...	37.93

1046. *Kochia indica*, Wight, H.F.B.I., v. 11.

Syn. :—*Panderia pilosa*, H. f. and T.

Vern. :—Kaura ro, bui (Pb).

Habitat :—North-West India, from Delhi to the Indus common. Dekkan; salt soils at Coimbatore.

An annual herb, erect and softly villous, diffusely branched from the base. Branchlets divaricate, long. Leaves small, elliptic or linear-oblong, acute. Wings of fruiting perianth short, broadly triangular-ovate, obtuse, thick, nerveless, much shorter than the diameter of the disk. Wight states that flowers are sometimes male only, and I think it probable that fertile males are on different plants from the female or hermaphrodite. (J. D. Hooker.)

Use :—The plant is employed medicinally in the Punjab (Stewart). Used as a vascular (cardiac) stimulant in cases of weak and irregular heart, especially when following on fevers, (Dr. Perry, in Watt's Dic.)

1047. *Salicornia brachiata*, Roxb., H.F.B.I., v. 12. Roxb. 28.

Vern. :—Oomarie Keeray (Tam.); Koyalu (Tel.).

Habitat :—Bengal, in salt marshes; and Tanjore.

A semi-shrubby, leafless, fleshy-jointed, seacoast marshy plant. Stem woody, 12-18 in., thick at the base, much branched, more or less erect, very much branched. Branches $\frac{1}{8}$ - $\frac{1}{4}$ in. diam. Joints $\frac{1}{4}$ - $\frac{1}{2}$ in., rather slender, slightly dilated and 2-toothed at top. Spikes 2-3 in., slender, cylindrical. Flowers 3-nate. Stamen 1. Utricle ovoid, subacute, style distinct. Seed pale-brown, hispid, with white hair. Testa thinly coriaceous. Embryo hooked, both ends pointing downward.

Use :—This is one of the numerous sources of the alkaline earth, *sajji*, used in medicine and in the arts. (Watt.)

1048. *Suaeda fruticosa*, Forsk., H.F.B.I., v. 13.

Syn. :--*Salsola fruticosa*, Linn.

Vern. :--Lconuk, chotee lanee, usak lanee (Pb.); Morasa (Mar.); Ushuklani (Sind.); Zimeh (Pushtu).

Habitat :--North-West India, from Delhi, and throughout the Punjab, westward to the Indus, common in the plains.

A perennial herb, sub-erect or decumbent. Stem and branches usually slender, erect or divaricate. Leaves $\frac{1}{2}$ -terete, linear or ellipsoid, obtuse (very variable) $\frac{1}{8}$ - $\frac{1}{2}$ in. long. Spikes slender, leafy. Flowers minute, axillary, usually 2-sexual, bracteate, and 2-bracteate. Perianth short, subglobose, 5-lobed or partite; lobes or segments equal or unequal, simple or gibbous or subwinged. Stamens 5, short; Styles 3, short. Fruit, utricle included, membranous. Seeds vertical or horizontal; testa black, shining.

Uses :--This is one of the plants from which *sajji-khar* is prepared. The woolly excrescences on the tips of its branches, mixed with an empyreumatic oil, are used as an application to sores on the backs of camels. The leaves are applied as a poultice to ophthalmia, and used, infused in water, as an emetic by Sindhis. (Stewart and Murray.)

1049. *S. monoica*, Forsk., H.F.B.I., v. 13.

Vern. :--Umari Nandi (South Arcot.)

Habitat :--South Deccan; on the seacoast at Tinnevely and Tuticorin.

Shrubby, branches suberect, leaves linear flattish obtuse, spikes leafy paniced, flowers axillary 2-3-nate polygamous, bracts minute scarious entire, fruiting perianth obovate-oblong, lobes obtuse incurved, styles 2-5 short, seed vertical, testa black shining. I am in great doubt about this Indian plant, which in a dry state is difficult to distinguish from *S. fruticosa* and *vermiculata*. (J. D. Hooker.)

Use :--It is put to the same uses as the preceding. From it also Sajji khar is prepared. *Indian Forester* for Nov. 1914, contains a note on Saltworts of South Arcot from the pen of Mr. T. P. Ghose, who says—

"The plants are dried in the sun for two or three days, care being taken not to overdo this. They are then burnt in round pits 3 to 4 feet in diameter and 2 to 3 feet in depth. As the stuff burns more of it is continually added to the burning mass which is always kept stirred. The fused alkali now comes out as a liquid and collects at the bottom of the pit in a separate mass which on cooling forms the "barilla" ready for export."

1050. *Salsola Kali*, Linn., H.F.B.I., v. 17.

Vern. :—Sajji bāti (Pb.).

Habitat :—N.-W. Punjab, common in Baluchistan.

Annual spinescent herbs; pubescent, scabrid or glabrous, usually glaucous. Stem 6-18 in., rarely erect, branches soft and pithy within, striped green white; diffusely branched from the base. Leaves short, subulate, lanceolate from a $\frac{1}{2}$ -amplexicaul base, thick rigid, pungent, $\frac{1}{2}$ -1 $\frac{1}{2}$ in., spreading and recurved. Flowers 1-3 together, axillary or subspicate, bracts sepals subequal pungent. Fruiting perianth cartilaginous, $\frac{1}{4}$ - $\frac{1}{2}$ in., diam transparent, often rose coloured; base rounded, wings obovate, orbicular or reniform, scarious, sometimes obsolete. Seed adherent to the utricule.

Use :—This plant is used in the manufacture of *sajji*.

1051. *Basella rubra*, Linn., H.F.B.I., v. 20. Roxb. 275.

Vern. :—Pói, lál-bachhe (H.); Rakto-púi, púisák (B.); Lál bachhe-kí-bháji (Duk.); Shirappu-vasla-kire (Tam.); Alla-batsalla, pedda-mattu-neatku-batsala, erra-allu-bach-chali (Tel.); Chovva-una-basella-kira (Mal.); Kempa-basale (Kan.); Mayák bháji, Velgond (Bomb.).

Habitat :—Throughout India under cultivation.

A much-branched, twining fleshy herb, glabrous. Leaves petioled, broadly ovate, or cordate-orbicular, 2-7 in. diam., narrowed into the petioles. Spikes 1-6 in., axillary peduncled, simple or branched. Flowers red. Fruit size of a pea, purple when mature.

"Roxburgh regards two varieties of this, a red and a regen-

stemmed one, as wild in India, and adds three cultivated sorts, a red and a white-stemmed that are raised from seed, and differ only in luxuriance from the corresponding wild forms; and lastly a large sort (*B. lucida*, L., and *cordifolia*, Lamk.), which is the most cultivated, and is always increased by slips; it is the largest form, covering trellises and native houses, and is the most succulent, and more used as a pot-herb than the others." (J. D. Hooker).

Uses:—The juice of the leaves is used in catarrhal affections of children. (Drury). Demulcent and diuretic, useful in gonorrhœa and balanitis. (Asst.-Surg. J. N. Dey, Jeypore, in Watt, I. 404.)

1052. *Basella alba*, Linn. H.F.B.I., V. 21.
Roxb. 275.

Eng.:—White basil or Indian Spinach.

Sans.:—Vishwa-tulasi.; Potaki; Upodika.

Vern.:—Poí, myal-ki-bháji, sufed-bachlá, safed-tulsi (H.); Sufed-bachlá-ki-bháji (Duk.); Wahlea (Mar.); Vasla-kire, Caujang kire, Vellapachalai (Tam.); Alubachebali, karu-bachchali, polam-bachchali, pedda-bach-chali (Tel.); Bili-básale-balli (Kan.); *Basella-kíra* (Mal.).

Habitat:—Cultivated all over India.

Uses:—The leaves are made into a pulp used to hasten suppuration.

The juice of the leaves, which is demulcent and cooling, is a popular application to allay the heat and itching of urticaria arising from dyspepsia, an affection which the Hindus consider to be indicative of bile in the blood. The boiled leaves are also used as a poultice.

N. O. PHYTOLACCACEÆ.

1053. *Phytolacca acinosa*, Roxb., H.F.B.I., IV.
Roxb., 389.

Vern.:—Jirrag (Kumaon); Lúbar, búrgu, denturû, rinsâg, jírka, matazor, sarunga (Pb.).

Habitat :—Temperate Himalaya, from Kashmir and Hazara to Bhutan.

A nearly glabrous, erect herb. Stems 3-5ft., robust, succulent. Leaves alternate, broadly lanceolate, 6-10in., entire long-pointed, narrowed into a short stalk; stipules none. Flowers $\frac{1}{2}$ in. diam., pale-green, 2-sexual, in leaf opposed, cylindrical; racemes 2-6in., long; bracts linear. Perianth 5, nearly separate segments. Stamens 8-10, filaments united at the base; anthers 2-celled, soon falling off. Ovary composed of 6-8 carpels arranged in a whorl, each with a short recurved stigma. Fruit dark-purple, succulent, crowded in an erect, thick raceme, 4-8in. long; carpels separating when ripe, each containing a single black shining kidney-shaped seed.

Uses :—The natives do not appear to use any part of the plant as a medicine, but in every district in which it is cultivated they seem to be fully aware of its power of producing delirium. It is commonly stated that the poisonous property is only destroyed by complete boiling. The narcotic virtues of certain American species are well-known, and it is possible that the Indian plant may be equally valuable. (Watt).

N. O. POLYGONACEÆ.

1054. *Calligonum polygonoides*, Linn., H.F.B.I., v. 22.

Vern. :—Balanja, berwaja, tatuke (Trans-Indus); Phok, phog, phogalli (flowers); tirni (root) (Pb. and Sind).

Habitat :—Punjab, Sind and Rajputana.

An almost leafless shrub or small tree with terete pale flexuous branches and very slender branchlets. Leaves most minute, bristles at the distant nodes. Flowering branches about as thick as a crow-quill or less; internodes 1-1 $\frac{1}{2}$ in. long. Pedicels $\frac{1}{8}$ - $\frac{1}{2}$ in., sepals 5, flat, about as long. Stamens 12-18. Ovary 4-angled. Fruit $\frac{1}{2}$ -1in. diam., a nut, 4-angled, oblong, hard, densely clothed with many series of branching intricate, rigid, red-brown flexuous bristles; seed about $\frac{1}{4}$ in.

Use :—The roots are bruised, and, boiled in combination with Catechu (Kath), used as a gargle for sore-gums. (Murray.)

1055. *Polygonum, aviculare* Linn., H.F.B.I., v. 26.

Vern. :—Indranee, bigbund, hunraj (Hind.); Kesrú, bandúke (Pb.); Miromati (Sans.); Machooti (Pb.); Drob (Kash.).

Habitat :—Western Himalaya, from Kashmir to Kumaon; Rawal Pindee and the Deccan.

A glabrous herb. Root mostly annual. Branches procumbent or ascending, grooved, leafy. Leaves elliptic or elliptic-oblong or lanceolate, obtuse flat, nerveless; stipules shorter than the internodes, hyaline, lacerate, many-nerved. Flowers axillary; pedicel short, pointed at the tip. Perianth obovoid, cleft to near the base; nut ovoid, obtusely 3-gonous, minutely rugosely striolate.

Uses :—In Chumba, the dried root is applied externally as an anodyne, and officinal in Kashmir. (Stewart.) The seeds are also said to be powerfully emetic and purgative. In Europe, the whole plant is considered vulnerary and astringent. In the *Year Book of Pharmacy* for 1874, an interesting account is given of the reputed value of the decoction of the herb in cases of vesical calculus. A case is described in which a dose of two tumblerfuls of the decoction is said to have been followed by almost immediate relief.

"It was used by the ancients to arrest hemorrhage, the seeds were considered to be laxative and diuretic and to arrest defluxions. For burning pains in the stomach the leaves were applied topically, and were used in the form of a liniment for pains in the bladder and for erysipelas. The juice was administered in fevers, tertian and quartan more particularly, in doses of two cyathi, just before the paroxysms. Arabian physicians consider it to be cold and dry, and reproduce what the Greeks have said concerning its medicinal uses.

In India, the plant is still used by the Hakims in the diseases named by Dioscorides.

In our own times *Polygonum* root has been used as a febrifuge in Algeria, and has been reported upon as being an excellent remedy for chronic diarrhoea and stone in the bladder. Its value has apparently been much exaggerated. (J. R. Jackson, *Amer. Journ. Pharm.*, 1873, p. 247.)

In the *Lancet*, (1885, p. 658) it is said to be used in Russia, under the name of Homeriana, as a popular remedy in lung affections. Dr. Rotschinin, who has experimented with the drug, found it really valuable in several cases of

bronchitis, two of which were capillary; also in three cases of whooping cough. It was tried in phthisis, but no definitely satisfactory results were obtained. A tumblerful of the decoction was given three times a day." (Pharmacog. Ind., Vol. III, p. 149.)

1056. *P. plebejum*, Br., *Var. indica*, H.F.B.I., v. 27.

Vern. :—Râniphûl (Santal).

Common in central and S. India, also in the Bombay Presidency.

Branches uniformly spreading all round from the crown and leafy, internodes short. Leaves $\frac{1}{4}$ - $\frac{1}{2}$ in. long, linear or obovate-oblong, flat, obtuse or apiculate; stipules very short. Flowers crowded in the axils, pedicels shorter than the perianth or none. Sepals broad, 2 outer acute. Nutlets $\frac{1}{4}$ in. (Duthie.)

Use :—The root is given for bowel complaints (Campbell).

1057. *P. viviparum*, Linn., H.F.B.I., v. 31.

Syn. :—*P. bistorta*, Linn.

Vern. :—Maslûn, bilauri, anjabar (Pb.).

Habitat :—Alpine and Sub-alpine Himalaya, from Kashmir to Sikkim, etc.

A perennial, glandular herb. Stem solitary, 4-12 in., slender simple, erect, from a woody root-stock as thick as the thumb or less. Root leaves long-petioled, linear or linear-oblong, acute, obtuse or cordate; 1-6 in., coriaceous, sometimes pubescent, or even tomentose beneath. Cauline leaves sessile, erect. Spikes 1-4 in. long, solitary, erect, slender. Bracts ovate, acuminate. Perianth very variable in size. Flowers suberect, pink, the lower re-placed by bulbils. Stamens included or exerted. Styles filiform, slender, free and included or greatly lengthened and connate below. Nut very small, trigonous, or biconvex.

Uses :—The root is a useful astringent and said to be applied to abscesses; a decoction may be used in gleet and leucorrhœa as an injection; makes an excellent gargle in relaxed sore-throat and spongy gums, and an excellent lotion for ulcers. Mixed with Gentian, it is given in intermittent fevers; also useful in passive hæmorrhage and diarrhœa (Dr. Stewart).

1058. *P. glabrum*, Willd., H.F.B.I., v. 34; Roxb. 334.

Vern.:—Sauri arak, jioti (Santal); Larborna, bih agui, bih langaui, patharua (Assam); Rakta rohida sheral (Bomb.); Atalaria (Tam.).

Habitat:—In ditches, etc., from Assam, Sylhet and Bengal westward to the Indus and Sindh, and southward to Burma, ascending the Himalaya to 6,400ft. in Garhwal.

Glabrous herbs. Stem 2-5ft., stout, slightly branched, somewhat swollen above nodes, shining purplish-red. Leaves usually large, 3-10in., linear-lanceolate, much tapering at both ends, entire, glabrous or slightly rough with minute prickles, minutely glandular; midrib prominent, broad, lateral veins numerous, pellucid. Petiole very short ($\frac{1}{8}$ - $\frac{1}{2}$ in.), stout; stipules about 1in., membranous, veined, truncate, not ciliate. Flowers bright-pink, numerous all the year round on short glabrous pedicels; racemes 1-3in., erect; bracts short, truncate, glabrous. Perianth $\frac{1}{2}$ - $\frac{1}{4}$ in., long, pink or white, not glandular; segments broadly oval, acute. Stamens usually 8 (sometimes fewer), shorter than perianth. Styles 2 divergent, sometimes 3, united above the middle; stigmas globose. Nuts black shining, $\frac{1}{8}$ in. in diam., usually rounded and flattened, 3-angled in the 3 styled flowers.

It is difficult to separate this from smooth forms of *P. Persicaria*, of which it is the tropical representative; it is, however, much larger, less branched, with more attenuate leaves brown when dry, and normally ciliate bracts and stipules. (Hooker.)

Uses:—An infusion of the leaves is used by the country people of Bombay to relieve pain in colic (Dymock). In Chutia Nagpur, it is employed as a cure for "stitch in the side," and in Assam as a remedy for fever (Watt).

1059. *P. persicaria*, Linn., H.F.B.I., v. 35.

Habitat:—Western Himalaya, Kashmir, etc.

Use:—It may be put to the same uses as the other species of this genus.

Annual, erect or ascending, leaves sessile, elliptic-oblong or lanceolate eglandular, stipules usually hirsute and ciliate,

racemes oblong dense-fid., bracts ciliate, pedicels glabrous, perianth red eglandular nerves slender, stamens usually 6.

Chem. Comp.—It has the following percentage composition:—Moisture 10.07, ash 6.52, ethereal oil 0.053, wax 1.92, tannin 1.52, mucic and pectic substances 5.42, calcium oxalate 2.18, total nitrogen 3.97, ammonia 0.31, cellulose 27.61, volatile acids 0.0464, sugar 3.24. The ash contains Na, K, Mg, Ca, Fe, Cl, SO_3 , SiO_2 , P_2O_5 , and several quantities of Mn. It was dissolved by light petroleum, consists of an easily hydrolysable phytosterol oleate along with free phytosterol, and a solid acid melting at 55°C . The ethereal extract contains chlorophyll and a resin, and the alcoholic extract, sugar, tannin, gallic acid, quercetin and phlobaphen; the latter is hydrolysed by dilute sulphuric acid forming a sugar which gives an osazone melting at $177^\circ\text{--}178^\circ\text{C}$. Only traces of volatile aminic bases are present, but considerable quantities of ammonia, the bases precipitated by phosphotungstic acid are two or three in number and differ in their solubility in chloroform and amyl alcohol. The ethereal oil is noteworthy as consisting principally of volatile fatty acids, especially acetic and butyric acids; the remainder is made up of a camphor-like solid with an agreeable odour (*persicariol*) and a liquid, not further investigated. (*J. S. Ch. I. Jan. 15, 1902, p. 66.*)

1060. *P. barlatum*, Linn., H.F.B.I., v. 37.

Syn.:—*P. rivulare*, Koen., Roxb. 335.

Vern.:—Narri (Pb.); Bekh-unjubaz (P.); Atalari (Tam.); Kondamalle, niru ganeru (Tel.); Velluta modela mukku (Malay); Dhâktâ sheral (Mar.); Mangarleta (Jaspur).

Habitat:—Throughout the hotter parts of India, from Assam to the Indus, and southwards to Malacca, Penang and Ceylon.

Stems erect, glabrous, $1\frac{1}{2}$ –3 ft. Leaves numerous, 5–6 in., linear-lanceolate, nearly sessile, tapering to both ends, acute, finely hairy on both sides and at margins; stipules $1\frac{1}{2}$ in., usually longer than internodes, strigose with long hair, ciliate, with strong coarse hair, as long as the tube. Flowers on short slender pedicels. Racemes 2–4 in., erect, slender, rather lax. Bracts strongly pectinate. Perianth white, without glands. Styles 3. Stamens 5–8. Fruit a nut, triangular, black shining.

Uses:—The seeds are employed in Malabar and Canara to relieve the griping pains of colic (Dr. Stewart, also Dr. Ainslie). In Patna, the root is used as an astringent and cooling remedy (Irvine). In China, a decoction of the leaves and stalks is said to be used as a stimulating wash for ulcers (Watt).

1061. *P. Hydropiper*, Linn., H.F.B.I., v. 39.

Vern.:—Packur-mul (B.).

Habitat:—Plains and hills of India, in wet places, from Assam, Silhet, Chittagong and Bengal to N.-W. India, and Madras.

A glabrous, rather robust annual. Roots tufted or shortly creeping. Stems erect and branches ascending, rather stout leafy, 12-18in. high; always glabrous, often glandular; nodes often swollen. Leaves rarely more than 3in. long, sessile or petioled, lanceolate or oblong-lanceolate, glabrous or with the midrib scabrid beneath. Stipules glabrous or sparsely strigose, very shortly ciliate. Racemes flexuous, leafy at base, filiform, decurved, interrupted; bracts glabrous, glandular or not. Perianth pinkish; mouth naked or minute, ciliate. Nut usually trigonous, opaque, finely granulate, sometimes flat.

Uses:—In China, the juice is used for itch, and also as a diuretic, carminative and anthelmintic (P.J. 20-12-84).

The root is stimulating, bitter and tonic, and is used for these properties in Patna (Irvine.) O'Shaughnessy states that the whole plant is reputed to be a powerful diuretic, but to lose its activity on drying.

"This plant possesses very acrid qualities, and is hot and biting to a degree, so that no animal will eat it, even insects avoid it; and it is said that when dried and laid amongst clothes no moth will touch them. Its bruised leaves are still used in villages instead of a mustard poultice, and they are put into the mouth to cure toothache. It is said to be a powerful diuretic, and a water distilled from it was formerly used in some nephritic complaints." (Sowerby's *English Botany*, Vol. VIII, pp. 71-72.)

Chem. comp.—Dr. C. J. Rademaker (Amer. Journ. Pharm., Nov. 1879) separated from *P. Hydropiper* a crystalline principle which he named Polygonic acid. H. Trimble and H. J. Schuchard (Am. Journ. Pharm., Jan. 1885) re-examined the plant with following results:—They found that the peculiar pungent principle, although present in a weak alcoholic tincture, disappeared on distillation, the pungent taste of the herb being absent from the distillate and the residue in the retort.

From these experiments they conclude that the active principle is decomposed on the slightest heating, and that the only proper preparation of the drug would be one made without the application of heat. They prepared the polygomic acid of Dr. Rademaker, and conclude from their experiments that it is only a mixture of impure tannic and gallic acids. (*Pharmacog. Ind.*, III pp. 150-151.)

1062. *P. alatum*, *Ham.*, H.F.B.I., V. 41.

Syn.:—*P. Nepalense*, *Meissu*.

Vern.:—Sat balon (Pb.).

Habitat:—Throughout the Himalaya, from Sikkim to Kashmir. Khasia Mts., Nilghiri Mts., Canara; and the Bababudan Hills.

An annual herb. Stem 1-2ft., long, rarely creeping for a short distance at the base, erect and sub-simple or branched from the base, erect, tall or low, glabrous or sparsely hairy. Branches 6-8in. high, slender or rather stout, flaccid or stiff. Leaves large or small ($\frac{3}{4}$ -1 $\frac{1}{2}$ in. long), ovate or deltoid, ovate-obtuse or acute or narrowed into a broadly winged, often amplexicaul, petiole, glandular or not. Stipules tubular, obliquely truncate. Peduncles glandular, hispid at tip. Involucre-leaf often longer than the head, sessile, ovate, cordate, obtuse or acute. Heads usually with an involucre leaf, $\frac{1}{4}$ - $\frac{3}{4}$ in. Bracts ovate-lanceolate, glabrous, not ciliate. Perianth 1-5-fid, stamens 7-8, included, sepals white or pale-purple, membranous, subequal, very variable in size. Style long, with one or two long arms and capitate stigmas. Nut varying in size, 1-in., the same head, closely invested and cohering with the thin perianth-tube and crowned with the lobes, bi-convex or tri-gonous, striate and punctate.

Use:—In Kangra its leaves are applied to swellings (Stewart).

1063. *P. Molle* *Don Brod.*, H.F.B.I., IV. 50.

Habitat:—Central and Eastern Himalaya; Nepal, Sikkim, Mishmi Hills.

Shrubby, erect, 3-6ft. Stems angled, hairy, becoming tomentose in the upper parts. Leaves stalked or the upper nearly sessile, oblong-lanceolate, 4-9in. by 1 $\frac{1}{2}$ -3 $\frac{1}{2}$ in., long-pointed, upper

surface glabrous or thinly hairy, the lower softly and densely hairy, especially in the mid-rib and nerves. Stipules tubular, very long, hairy, strongly nerved, pointed. Flowers white or tinged with pink, in terminal, usually erect, panicles, 6-18in. long. Bracts flat. Perianth 5-parted, $\frac{1}{4}$ in. diam. Stamens 8. Styles 3, free nearly to the base. Nut 3-angled, pale-brown.

Use :—It is used for the same purposes as *P. Hydropiper* and *P. alatum*. It is astringent.

1064. *Rheum spiciforme*, Royle, H.F.B.I., v. 55.

Habitat :—Western Himalaya; in the drier ranges, from Kumaon westwards to Western Tibet.

A stemless herb. Root short or long, thicker than the thumb. Leaves all radical, 6-12in. diam., very leathery, with prominent radiating nerves and reticulated nervules beneath, red-brown in age, orbicular, broadly ovate or cordate, glabrous or stellately puberulous beneath. Petiole 3-6in., very stout, glabrous or puberulous. Racemes 1-3, glabrous, radical, 4-12in., strict, dense-fid. Peduncle and rachis stout, glabrous. Bracts minute, ovate, scarious. Flowers $\frac{1}{10}$ in. diam., on capillary pedicels. Fruit broadly ellipsoid or oblong, wings membranous, broader than the disk, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, 3-4-times as long as the oblong obtuse sepals; tip rounded or notched, wings membranous. Pedicel half as long as the fruit or less.

1065. *R. Moorcroftianum*, Royle, H.F.B.I., v. 56.

Habitat :—Western Himalaya; Kumaon.

Stemless species of stout herbs, with woody large roots. Flowers in a spike like raceme. "This plant," says J.D. Hooker, "differs from *R. spiciforme* in the very much larger pubescent peduncles and racemes which together are two feet long, and in the form of the fruit." Leaves all radical, thickly coriaceous, orbicular, glabrous or stellately puberulous beneath. Racemes pubescent, fruit ovoid, wings narrow.

1066. *R. emodi*, Wall., H.F.B.I., v. 56.

Vern. :—Revand-chini (H. and B.); Révande-hindi (Pers.);

Variyattu (Tam.) ; Natturéval-chinni (Tel.) ; Gamni-revan-chini (Guz.) ; Padam-chal (Nepal) ; Archu (Garhwal) ; Mulkâ-cha-reval-chini (Mar.) ; Nat-reva-chinni (Kan.).

Habitat :—Sub-alpine and Alpine Himalaya ; Nepal, Sikkim and Simla.

Herbs. Stem very stout, tall, branched, leafy ; 5-6ft. high, streaked, green and brown. Root very stout. Radical leaves often 2ft. diam., papillose beneath, scabrous above ; petiole 12-18in., very stout, scabulous, orbicular, or broadly ovate, obtuse ; base cordate, 5-7-nerved. Panicle leafy, papillosely puberulous, fastigately branched, 2-3ft. Flowers dark-purple, $\frac{1}{8}$ in. diam. Fruit $\frac{1}{2}$ in. long, oblong, ovoid, purple, base cordate, apex notched, wings narrower than the disk.

1067. *R. acumdatum*, Hook. f. and Thom., H.F.B.I., v. 57.

Habitat :—Sikkim, Himalayas.

Probably only a small form, says J. D. Hooker, of *R. Emodi*, Wall., with acuminate leaves, but the flowers are considerably larger, and, though long under cultivation, it does not attain half the size of that plant or vary in its character. Stem leafy ; leaves long-petioled, triangular or orbicular, ovate, acuminate ; base cordate, 5-7-nerved, panicles papillosely puberulous, fastigately branched and leafy ; flowers red ; fruit ovoid, oblong, base, cordate, tip entire or notched, wings narrower than the nucleus.

1068. *R. Webbianum*, Royle, H.F.B.I., v. 57.

Habitat :—Central and Western Alpine Himalaya.

Very variable in size, from 1 to 6ft. high, stem branched, leafy. Leaves 4in.—2ft. in diam. ; long-petioled, orbicular-cordate or reniform, 5-7-nerved papillose or glabrous, tip rounded or sub-acute. Panicles axillary and terminal, leafy, quite glabrous. Flowers pale-yellowish, very much smaller than *R. Emodi*, the panicles less strict, the fruit broader, $\frac{1}{2}$ in. diam., with broader wings. Fruit notched at both ends.

Uses:—The roots of the several species of *Rheum*, described above, inhabiting the elevated portions of Himalaya, constitute the principal portion of the Indian or Himalayan Rhubarb. There are two principal varieties, 1. *The large* (from *R. Emodi*?) ; occurs in twisted or cylindrical pieces of various sizes and shapes, furrowed; cut obliquely at the extremities, about four inches long and an inch and a half in diameter; of a dark brown colour, feeble rhubarb odour, and bitter astringent taste; texture radiated, rather spongy, not presenting on fracture the marbled texture characteristic of ordinary rhubarb; pulverized with difficulty; powder of a dull brownish yellow colour. 2. *The small* (from *R. Webbianum*); consists of short transverse segments of the root branches; of a dark-brownish colour, odourless, or nearly so, with a very bitter astringent taste. Both kinds are liable to considerable variation in physical characters. The trials made with Himalayan rhubarb by Prof. Royle (*Calcutta Med. Phys. Trans.*, vol. iii. p. 439), and Mr. Twining (*Diseases of Bengal*, vol. i. p. 220), were productive of satisfactory results; the latter authority, indeed, regarded it as superior to imported rhubarb as a stomachic tonic. Subsequent experience has not confirmed this view. The general tenor of all the reports received from India in which this drug is noticed is to the effect that the indigenous rhubarb procured in the bazaars is generally worthless, and unfitted to replace the imported article. Dr. Hugh Cleghorn (*Madras Quart. Med. Journ.*, 1862, vol. v., p. 464), who furnishes some interesting remarks on Himalayan Rhubarb, states that it is only an inferior variety that reaches the plains of Hindustan. He tested the action of the fresh root, and found it resemble that of Russian Rhubarb. Cultivated with due care, there is reason to believe that a good serviceable drug, equal to Chinese or Turkish Rhubarb, might be obtained from the Himalayan plants. (Ph. Ind.)

In the Second Rept. of Indig. Drugs Comm. (p. 71) Capt. W. M. Anderson, I.M.S., who used the powder, gives his opinion, as to the value of the drug, as follows:—

“Not satisfactory as a purgative; requires to be given in 5—10 gr. doses; is very liable to gripe and is irregular in its action. In some cases the bowels were only opened after repeated doses.”

1069. *Oxyria digyna*, Hill. H.F.B.I., v. 58.

Vern.:—Amlu ; Chohahak (Pb.).

Habitat:—Alpine Himalaya, from Sikkim to Kashmir.

An erect, fleshy-glabrous herb. Rootstock tufted, with many erect succulent stems, 4-18in. high. Leaves radical, many, long-petioled, 1-4in. diam., rarely 3-lobed or sub-hastate, cauline 1-2 ; petiole sometimes 8in. Racemes slender, paniced. Flowers 2-sexual ; pedicels pointed in the middle ; tip thickened. Outer two sepals, spreading or reflexed ; inner two spatulate, 3-5-nerved. Stamens 6. Ovary compressed. Styles 2, short, stigmas fimbriate. Fruit a nut, 2-winged, biconvex, $\frac{1}{8}$ - $\frac{1}{4}$ in. diam., orbicular-cordate, wing membranous, veined, top notched.

A most agreeable salad, raw and cooked. Except in often attaining a very large size (18in. high), the Himalayan plant does not differ from the European. (Hooker.)

Use:—In Chumba it is eaten raw and in *chatni*, and is considered cooling, and in Kanáwár it is known as a medicine (Stewart).

1070. *Rumex maritimus*, Linn., H.F.B.I., v. 59.

Syn.:—*R. acutus*, Roxb. 309.

Vern.:—Jangli-palak, júl-palam (H.) ; Bun-palung (B.) ; Húlá obúl ; Zagû-kei ; Khattikan ; Bij-band (Pb.).

Habitat:—Marshes in Assam, Silhet, Cachar and Bengal.

An annual herb, rather shrubby. Stem 1-4ft., angled and deeply grooved. Leaves 3-10in., lanceolate, narrowed into the petiole. Whorls of flowers lax or dense, many-or few-fid. Panicles leafy to the top. Flowers 2-sexual. Fruiting perianths all unarmed, or on the same plant, some armed and some unarmed, yellow-brown when ripe, tubercle smooth, with a narrow, sometimes reticulate, margin ; spine sometimes 4 times as long as the valve ; tip straight or slightly hooked. Stamens 6. Ovary 3-gonous ; styles 3, terminal. Stigmas fimbriate. Nut included in the usually enlarged inner sepals (valves), angles acute.

Uses:—The plant has cooling properties, the leaves are applied to burns and the seeds are sold as *bij-band* of the

bázárs, and used as an aphrodisiac (Atkinson).

N. B.—According to Murray (*Plants and Drugs of Sind*), the fruit of *Polygommi aviculare* is known as *Bijband* or *Endrani* in Sind. It is probable that seed of several species of *Polygonum* and *Rumex* are collected and sold as *Bijband*.

1071. *R. dentatus*, Linn., H.F.B.I., v. 59.

Habitat:—Plains of India, from Assam and Sylhet to the Indus, ascending the Himalaya to 1,000 ft., Sind and Concan.

An erect annual, 1-2 ft. high. Stems grooved, glabrous, usually tinged with red. Leaves 3-4 in. long, oblong, obtuse, glabrous, base rounded or cordate, petioles of radical leaves up to 2½ in. long. Flowers shortly pedicelled, 2-sexual, arranged in distinct leafy or leafless whorls. Perianth ½-¾ in. long; inner segments broadly ovate, reticulate-veined, much enlarged in fruit and with an ovoid-oblong smooth tubercle on its back, margins irregularly toothed or pectinate; the teeth numerous, short, straight, not hooked. Nutlets ⅓ in. long, acutely 3-gonous or almost winged. (Duthie.)

Use:—The root yields a dye, and is used as an astringent application in cutaneous disorders (Watt).

1072. *R. nepalensis*, Spreng., H.F.B.I., v. 60.

Habitat:—Temperate Himalaya, from Bhotan to Kashmir; Khasia Mts., Western Peninsula; on the Ghats.

Tall herbs. Roots with tuberous fibres. Stem 2-4 ft. stout, erect. Branches stiff, spreading. Radical leaves often 6-14 by 3-5 in., undulate or not, large oblong, ovate-oblong or triangular-ovate, acute or obtuse, base widely or narrowly cordate, upper sessile or petioled, similar or with narrowed bases, or lanceolate. Flowers 2-sexual, in whorls forming long, nearly leafless, racemes. Fruiting sepals broadly ovate, fringed one thickend and forming an oblong tubercle.

Uses:—The tuberous roots are said to be sold in the bázárs of Bengal under the name of *Rewund Chini* as a substitute for rhubarb. They are given in constipation, in doses of 10 gr. to 120 gr. (Irvine).

Oswald Hesse has isolated from the root three new substances, one of which, rumicin, is isomeric with, and closely resembles, chrysophanic acid, but is not identical with it.

Rumicin, $C_{15}H_{10}O_4$, crystallises from light petroleum in golden-yellow leaflets with metallic lustre, and melts at $186-188^\circ$; the solution in caustic potash is purple-red, becoming colourless on exposure to carbonic anhydride, which precipitates rumicin. When heated with hydriodic acid, it yields chrysophano-hydro-anthrone, which is obtained from chrysophanic acid under the influence of the same agent.

Nepalin, $C_{17}H_{14}O_4$, crystallises from glacial acetic acid in microscopic, orange needles, and melts at 136° ; it is insoluble in alkali carbonates, but dissolves in caustic potash, forming a purple solution, which becomes colourless under the influence of carbonic anhydride. The solution in concentrated sulphuric acid is blood-red. The *diacetyl* derivative crystallises from glacial acetic acid in lustrous, brownish-yellow rhombohedra, which darken at 170° , and melt at 181° .

Nepodin, $C_{15}H_{10}O_4$, crystallises from a mixture of benzene light petroleum in long, greenish-yellow prisms, and melts at 158° . It dissolves readily in alkali carbonates, forming a yellowish-brown solution; the solution in concentrated sulphuric acid is an intense, yellowish-red colour. The *diacetyl* derivative crystallises in pale-yellow rhombohedra, darkens at 180° and melts and decomposes at 168° .

These three constituents of *Rumes nepalensis*, of which nepalin greatly preponderates, are separated from one another by extracting the root with ether, removing nepodin by means of aqueous potassium carbonate, evaporating the ether, and extracting the rumicin from the residue with boiling acetone; the nepalin remaining undissolved. (J. Ch. S. 1896 A. I. 573.)

Rumicin is chrysophanic acid, uncontaminated with methyl. chrysophanic acid, whilst nepalin is identical with nepodin, $C_{15}H_{10}O_4$. (J. Ch. S. 1900 A. I. 41).

1073. *R. vesicarius*, Linn., H.F.B.I., v. 61.; Roxb. 309.

Sans. :—Chukra ; Shutavedhee.

Vern. :—Chuká Chukápálang (H. and B.) ; Shakkan-kirai (Tam.) ; Shukk-kura-ku (Tel.) ; Sukhasag (Assam) ; Ambut chuká (C. P.) ; Triwakka, khatbíri, khattítan, khatta mitha, saluní (Pb.) ; Chuká (Sind) ; Ambari, chukká (Deccan) ; Chuká (Bomb.).

Habitat :—Western Punjab ; on the Salt Range and Trans-Indus hills ; cultivated, and an escape in other parts of India.

A pale-green annual, monœicous, glabrous, 6-12in. high, dichotomously branched from the root, rather fleshy. Leaves petioled, elliptic, ovate or oblong, 3-5-nerved, base cuneate, rarely cordate or hastate, 1-3in. acute or obtuse. Petiole as long as the blade. Racemes short, terminal, leaf-opposed, leafless, 1-1½in.;

pedicels slender, jointed about the middle or unjointed. Flowers sometimes 2-nate and connate, valves large, orbicular, 2-lobed at each end, very membranous and reticulate without a marginal nerve. Fruit $\frac{1}{2}$ in. diam., white or pink; valves hyaline.

Uses:—It has obtained the name of Sorrel in India, and is considered by the natives as cooling and aperient, and, to a certain extent, diuretic (Ainslie). The juice is said to allay the pain of toothache, and by its astringent properties to check nausea, promote the appetite and allay morbid craving for unwholesome substances. It is also considered very cooling and of use in heat of stomach, and externally as an epithem to allay pain, especially that caused by the bites or stings of reptiles and insects. The seeds are said to have similar properties, and are prescribed roasted in dysentery, and as an antidote to scorpion stings. The root is also medicinal (Dymock).

N. O. ARISTOLOCHIACEÆ.

1074. *Braganita Wallichii*, Br., H.F.B.I., v. 73.

Vern.:—Alpam (Mal.).

Habitat:—Deccan Peninsula; in the western forests, from the Southern Concan southwards.

An erect slender shrub, 6-10 ft. Bark smooth, yellowish. Twigs swollen above the nodes. Young parts finely pubescent. Branches angled. Leaves distichous, 5-7 in., linear-lanceolate, acute at base, attenuate, very acute, entire, glabrous above, minutely pubescent and paler beneath, 3-nerved at base, veins prominent beneath. Petiole very short, stout. Flowers purple or greenish on rather long pubescent pedicels, in shortly stalked, irregularly umbellate cymes. Bracts small, linear. Perianth segments over $\frac{1}{4}$ in., ovate, pubescent, concave. Capsule 3-4 in., obtuse, 4-seeded. Seeds acute at both ends, deeply rugose. Leaves slightly aromatic when bruised (Trimen).

Uses:—The juice of the leaves, like that of many plants of this Natural Order, is valued as an antidote in venomous snake bites, especially in that of the Cobra. Fra Bartolomeo (Voyage,

p. 416) quotes a Malabar proverb, to the effect "as soon as Alpan enters the body, poison leaves it." (Ph. Ind.) This is regarded as one of the most powerful antidotes to poison known on the West Coast. The whole plant mixed with oil and reduced to an ointment is said to be very efficacious in psora or inveterate ulcers (Drury).

1075. *B. tomentosa*, Blume., H.F.B.I., V. 73.

Habitat :—Silhet.

A low, herbaceous plant. Stem creeping below, and rooting, then ascending, 6-12in., simple angular, geniculate, tomentose. Leaves densely tomentose beneath 4-6 by 2½-4in., 1-3, oblong or ovate-cordate smooth, opaque above, 6-9-nerved at the base and penni-nerved beyond; the first pair of basal nerves not reaching the middle of the leaf. Flowers in simple spikes, ½-¾in. diam.; bracts oblong persistent. Perianth-lobes rounded-cordate, acute. Stamens 6. Capsule 2in. long, straight; Seeds ½in. long, 3-gonous, rugose.

Use :—It possesses intense bitterness, and, according to Horsfield, is employed by the Javanese as an emmenagogue (Ph. Ind.).

1076. *Aristolochia bracteata*, Retz., H.F.B.I., V. 75; Roxb. 400.

Sans :—Dhûmrâpatra.

Vern. :—Kirâamâr gandân or gandatî (Hind. and Dec.); Addu-tina-pally (Tam.); Gadidegada-para-âku (Tel.); Gandhâtî, kidâmârî (Bom.); Kadapara (Tel.); Atutinâppâla (Mal.); Paniri (Uriya).

Habitat :—Deccan Peninsula, northward to Bundelkund, and Scinde.

Perennial herbs, quite glabrous. Roots slender. Stem or branches slender, 12-18in., angled, striate. Leaves 1½-3in. long and broad, widely and shallowly cordate at base or reniform, tip obtuse or subacute, margins flat or waved, glaucous beneath. Petiole 1-1½in. Peduncle short; bracts usually orbicular, variable in position, sometimes basal. Flowers solitary.

Perianth 1-1½ in., base globose, tube cylindric, erect, slender, lip erect, linear, as long as the tube, dark-purple with rootute edges, villous, with purple hairs. Anthers six. Styler column 6-lobed. Fruit a pyriform capsule, lin. long, many grooved. Seeds triangular, cordate.

Uses.—Every part of this plant is nauseously bitter, which remains long, chiefly about the throat. For a purging with gripes, two of the fresh leaves are rubbed up in a little water, and given to an adult for a dose, once in 24 hours (Roxb.).

It is well-known by its Hindustani name *Kirâ-mâr*,¹ from its supposed anthelmintic properties, and also probably from the fact of the expressed juice of the leaves being applied to foul and neglected ulcers, for the purpose of destroying the *larvæ of insects*. A belief in the anthelmintic virtues of the leaves is common amongst the natives. In Dalzell and Gibson's *Flora of Bombay* (p. 225), it is spoken of as possessing "a merited reputation as an antiperiodic in intermittent fevers." Emmenagogue properties are also assigned to it. Dr. J. Newton reports that in Scinde the dried root, in doses of about a drachm and-a-half, in the form of powder or in infusion, is administered during labours to increase uterine contractions (Ph. Ind.).

The leaves are applied to the navel to move the bowels of children, and are also given internally in combination with castor oil as a remedy for colic.

Dr. Hove states that the root and leaf are remarkably bitter, and yield a thick yellowish juice, which is mixed with boiled milk and given in syphilis, and combined with opium is used with great success in gonorrhœa. Ainslie notices the application of the leaf, when bruised and mixed with castor oil, to obstinate psora (the carpang of the Tamils.)

The native doctors in Bombay make a paste, with water, of the plant, along with the seeds of *Barringtonia acutangula*, *Celastrus paniculata*, and black pepper, and rub the whole body with it for the cure of malarial fevers.

The evidence collected by Dr. Watt (Dict. Ec. Pr. India, i. 314) shows that it is the opinion of several European phy-

sicians in different parts of India that the plant has a decided action upon the uterus, and increases or induces uterine contractions. There appears to be no doubt as to its anthelmintic properties. (Dymock).

Chem. comp.—The plant contains a nauseous volatile substance, an alkaloid, and a large quantity of salts. The alkaloid is amorphous and gives no colour reactions with the strong mineral acids. The bitter concentrated tincture on standing deposited cubical crystals of potassium chloride. The ash calculated on the air-dried plant was 17.75 per cent., and strong alkaline fumes were given off from the plant when burning.

1077. *A. indica*, Linn., H.F.B.I., v. 75; Roxb. 622.

Sans. :—Rudrajatâ, Arkamula; Sunanda; Ishvari.

Vern. :—Isharmul, isharmûl-kî-jar (H. and Duk.); Isarmul (B.), Bhedi jane-tet (Santal); Sâpasand (Bomb. and Mar.); Arkmula, ruhimula (Cutch and Guj.); Peru-marindu, perum-kizhangu (Tam.); Ishvara-vêru, dûla-gôvela, govila (Tel.); Karalekam, karukakpulla, karal-vekam, ishvarâ-muri (Mal.); Ishverivêrû (Kan.); Ich-chura-muliver (Tam.).

Habitat :—Throughout the low country of India, from Nepal and lower Bengal to Chittagong; and the Deccan Peninsula, from the Concan southward.

Shrubby, quite glabrous, twining, prostrate herbs. Stems slightly woody at base, branches slender. Leaves very variable, membranous, linear, ovate, obovate-oblong, or subpan-duriform; base cuneate or rounded; basal nerves short; in the narrowest form 4 by $\frac{1}{2}$ - $\frac{1}{3}$ in, in the broadest 4-5 by 3 in., abruptly or gradually obtusely acuminate or apiculate, often oblong and quite obtuse. Petiole $\frac{1}{4}$ - $\frac{1}{3}$ in., very slender. Perianth straight, greenish-white; base globose; tube shortly funnel-shaped; mouth oblique, trumpet-shaped, gradually passing into short, oblong, obtuse, glabrous, purple and brownish lip. Flowers 1-3; corymbs short, pedunculate. Anthers 6; stylar column 6-lobed. Capsule $1\frac{1}{2}$ -2 in. long, oblong, grooved. Seeds flat, triangular, winged.

Uses :—The root, which is very bitter, is held in much esteem by the natives as a stimulant, tonic, and emmenagogue, and is employed by them in intermittent fevers and other affections.

Nothing certain is known of its virtues; but Dr. Kirkpatrick (*Cat. of Mysore Drugs*, No. 455) considers that its properties as a febrifuge are deserving of investigation; and Dr. Fleming, judging from the aromatic bitterness of the root, is of opinion that it will be found useful in dyspepsia (*Asiat. Researches*, vol. xi.). Dr. Gibson regards it as valuable in bowel affections. From its sensible properties, and the high esteem in which it is held by the natives, it may be worthy of further notice. It is as an antidote to snake bites, however, that it has obtained most repute, and by the early Portuguese settlers was termed *Raiz de Cobra*, from its supposed efficacy in those cases, even in the bite of the *Cobra de Capello*. The leaves, and the expressed juice of the leaves, have more recently been brought to notice in the same class of cases by Mr. Lowther (*Journ. of Agri.-Hort. Soc. of India*, 1846, vol. v. pp. 138, 742, and vol. vii. p. 42.) (Ph. Ind.). It seems to be, however, more used by the native Madras physicians for snake-bite than in the Dekkan or Concan where I come from. I am not aware of the drug being experimented on by any European physicians. It is worth a trial on theoretical grounds certainly (K.R.K.).

In Bombay it is chiefly prescribed in the bowel complaints of children; and in cholera it is regarded as a stimulant tonic, and is also applied externally to the abdomen. Babu T. N. Mukharji states that the juice of the fresh leaves is very useful in the croup of children, by inducing vomiting, without causing any depression.

Dr. S. M. Shircore of Moorshidabad states that it is undoubtedly used to procure abortion.

"With regard to the antidotal properties ascribed to *Aristolochia*, Dr. Hance remarks that undoubtedly no genus comprising a large number of species, widely diffused over both hemispheres, has been so universally credited with alexiteric properties as *Aristolochia*, and this, too, in all ages, and in every condition of society, alike by the wandering savage and the polished citizen or learned physician of a highly civilized commonwealth.***

"Modern physicians seem with one accord to regard these plants as diaphoretics, stimulant tonics, and emmenagogues only; but the array of testimony from all quarters of the globe, and extending over a period of more than two thousand years, in favour of their alexiteric properties, is so overwhelming, that it is in my judgment incredible that these virtues should be imaginary."—(Ph. J. March 15, 1873, pp. 725-726.)

Mr. R. Modlen concludes a paper "on the *Aristolochiaceæ* as antidotes to snake-poisons" in the Ph. J. for Nov. 20, 1880, p. 411, as follows :

"Although we English pharmacists may never be in a position to test this remedy, still it seemed to be one of sufficient interest to be noted. Strangely enough, the only place in this neighbourhood (Oxford) where I have seen an adder is the only locality for *A. Clematis*."

According to the authors of the *Pharmacographia Indica*, the roots contain an alkaloidal principle.

N. O. PIPERACEÆ.

1078. *Piper longum*, Linn., H.F.B.I., v. 83. Roxb. 52.

Syn. :—*Chavica Roxburghii*, Miq.

Sans. :—Pippali.

Vern. :—Pipul (H. and B.); Pippul-chitto (Tel.); Pipili (Tam.); Bangâli-pim-pali (Bomb.).

Habitat :—Hotter provinces of India, from East Nepal to Assam, the Khasia Mts. and Bengal, westward to Bombay and southward to Travancore.

Root-stock erect, thicker pointed, branched. Stems herbaceous, numerous, creeping below; young shoots downy, branches prostrate or creeping with broad, glabrous leaves. Flowering shoots erect. Branches soft, angular and grooved when dry. Leaves generally membranous. Lower leaves 2-3 in., ovate, cordate, often rounded ovate, acuminate, 7-nerved; sinus rounded, but narrow; basal lobes equal; petiole 1-3 in. Upper leaves narrower, oblong, cordate, sessile, amplexicaul; 2-5 in. basal lobes often unequal. Spikes simple, solitary. Flowers dioecious. Male spikes 1-3 in., female $\frac{1}{2}$ - $\frac{2}{3}$ in. broad, 1-1 $\frac{1}{2}$ in. long, blackish-green, shining, short, sub-erect. Fruit about $\frac{1}{10}$ in. diam., in dense cylindric, rarely globose spikes.

Uses :—Like *Black Pepper*, it contains a volatile oil, an acrid resin and piperine; and, like it, it possesses stimulant carminative properties, but *more powerful*. Its chief use is as a condiment. Dr. Herklots reports favourably of the following Mahomedan nostrum in the treatment of beri-beri: Take of Long Pepper, bruised, four ounces; Black Pepper and

Ginger, of each half an ounce; Arrack, twenty ounces. Macerate for seven days and strain. Dose, a drachm twice or thrice daily. A powerful stimulant, with probably no special claim to notice. The root is in great repute amongst the natives of India; it is the *Peepla-mool* of the "Táleef Shereef" (p. 55, No. 275), where it is described as bitter, stomachic and useful in promoting digestion. In Travancore, an infusion of the root is prescribed after parturition, with the view of causing the expulsion of the placenta. It appears to partake, in a minor degree, of the stimulant properties of the fruit (Ph. Ind.).

As an alternative tonic, long pepper is recommended for use in a peculiar manner. An infusion of three long peppers is to be taken with honey on the first day, then for ten successive days the dose is to be increased by three peppers every day, so that on the tenth day the patient will take thirty at one dose. Then the dose is to be gradually reduced by three daily, and finally the medicine is to be omitted. Thus administered, it is said to act as a valuable alterative tonic in paraplegia, chronic cough, enlargements of the spleen and other abdominal viscera. Long pepper enters into the composition of several irritating snuffs; boiled with ginger, mustard oil, buttermilk and curds it forms a liniment used in sciatica and paralysis. In the Concan, the roasted aments are beaten up with honey and given in rheumatism; they are also given powdered with black pepper and rock salt (two parts of long pepper, three of black, and one of salt) in half tola doses in colic. Mahometan writers, under the name of Darfilfil, describe long pepper as a resolvent of cold humours; they say it removes obstructions of the liver and spleen, and promotes digestion by its tonic properties; moreover, it is aphrodisiacal, diuretic, and emmenagogue. Both it and the root (*Filfil-muiyeh*) are much prescribed in palsy, gout, lumbago, and other diseases of a similar nature. A collyrium of long pepper is recommended for night blindness; made into a liniment, it is applied to the bites of venomous reptiles. (Dymock).

1079. *P. Chaba*, Hunter, H.F.B.I., v. 83; Roxb., 52.

Sans. :- Chavika.

Vern. :—Chab (H.) ; Chai, choi (B.) ; Kankala (Bomb.).

Habitat :—Cultivated in various parts of India.

A stout, climbing herb, quite glabrous. Stem rooting. Branches flexuous, terete, hard, finely striate when dry, pale. Leaves 5-7 by $2\frac{1}{2}$ - $3\frac{1}{2}$ in., rather coriaceous, pale when dry, shining above, oblong, ovate or lanceolate, acuminate, 3-5-nerved at the very obliquely cordate, auricled base, penni-nerved above it ; 3-6 pair nerves above the basal nerves. Nervules arching. Petiole $\frac{1}{4}$ - $\frac{1}{2}$ in. Fruiting spikes stoutly peduncled, sub-erect, conico-cylindric, 1-2 in. long, $\frac{1}{2}$ in. diam., broadest at the base, obtuse, forming a fleshy cone of innumerable fruits, $\frac{1}{2}$ in. diam. The alternate nerves of the main portion of the leaf all starting from the midrib are very characteristic of the species (J. D. Hooker).

Uses :—It partakes of the stimulant and carminative properties of Black and Long Pepper, but does not appear to possess any special claim to notice. Its use in hæmorrhoidal affections is noticed in the "Taleef Shereef," p. 66, No. 340. (Ph. Ind.)

1080. *P. sylvaticum*, Roxb., H.F.B.I., v. 84 ; Roxb., 52.

Vern. :—Pahâri pipal (B.).

Habitat :—Upper and Lower Assam ; jheels of Bengal.

A low, creeping herb, glabrous. Stem flaccid, angular, succulent, several feet long, contracting much in drying. Branches short, erect or ascending, flexuous. Leaves rarely puberulous on the nerves beneath, lower 3 by $2\frac{1}{2}$ -3 in., nerves slender ; upper as long but narrower ; membranous, long-petioled, broadly ovate or ovate-cordate, acuminate, 5-7-nerved from the base or the linear pair, higher, inserted. Upper leaves elliptic or oblong-lanceolate, shorter-petioled. Petioles of lower leaves 2-4 in. Spikes shortly peduncled. Male spikes slender, 2-3 in., clothed with peltate bracts. Stamens generally 4 (Roxburgh finds 2). Anthers reniform ; cells confluent, dehiscing over the crown ; fruiting females always erect, $\frac{2}{3}$ - $1\frac{1}{2}$ in. Fruit free, $\frac{1}{2}$ - $\frac{1}{3}$ in. diam.

Use :—The fruit is used by the natives of Bengal as a carminative similarly to long-pepper (Watt).

1081. *P. Betle*, *Linn.*, H.F.B.I., v. 85 ; Roxb.,

Syn. :—*Chavica Betle*, *Miq.*

Sans :—Tâmbûla.

Vern. :—Pân (H. and B.) ; Vettilee (Tam.) ; Tamal-pakoo (Tel.) ; nâgavela (Bom.) ; Vetta (Mal.).

Habitat :—Cultivated in the hotter and damper parts of India.

Stems and branches stout, climbing, compressed when coriaceous, ovate ; base usually cordate and unequal-sided ; blade 3-8in. ; petiole $\frac{1}{2}$ -lin. Supra-basal nerves alternate. Spikes, male 3-6in., female longer, peduncled and longer than the leaves. Fruiting spike cylindric, pendulous, 1-5in. long, stout. Fruit $\frac{1}{8}$ - $\frac{1}{4}$ in. diam. very fleshy and often confluent into a cylindric red mass. Most plants female, says Brandis.

The ancient Hindu writers recommended that betel-leaf should be taken early in the morning, after the morning, after meals and at bed-time. According to Susruta, it is aromatic, carminative, stimulant, and astringent. It sweetens the breath, improves the voice, and removes all foulness from the mouth. According to other writers it acts as an aphrodisiac. Medicinally it is said to be useful in diseases supposed to be caused by deranged phlegm, and its juice is much used as an adjunct to pills administered in these diseases, the pills being rubbed into an emulsion with the juice of the betel-leaf and licked up. Being always at hand, Pan leaves are used as a domestic remedy in various ways. The stalk of the leaf smeared with oil is introduced into the rectum in constipation and tympanitis of children, with the object of inducing the bowels to act. The leaves are applied to the temples in headache for relieving pain, to painful and swollen glands for promoting absorption, and to the mammary gland with the object of checking the secretion of milk. Pan leaves are used as a ready dressing for foul ulcers, which seem to improve under them." (U. C. Dutt.)

" Its leaves, in conjunction with lime and the nut of *Areca Catechu*, are almost universally employed as a *masticatory*. The juice of the leaves is regarded as a *valuable stomachic*. Amongst the Indo-Britons of Southern India a use is made of the leaves, which merits notice. In catarrhal and pulmonary affections generally, especially of children, *the leaves warmed and smeared with oil* are applied in layers over the chest ; and the Editor, from personal observation in many instances, can testify to the relief afforded to the cough and dyspnoea, far more than can be accounted for by the warmth and exclusion of air, or by any rubefacient effect it produces, which, indeed, is very slight in most cases. Dr. Gibson, who corroborates this statement, states that he has often seen the application afford marked relief in congestion and other affections of the liver. Mr. J. Wood reports that the leaves warmed by the fire and applied in layers over the mammae are used effectually for arresting the secretion of milk. Their use in this manner is also noticed by Dr. J. Shortt, who adds that the leaves are similarly employed as a resolvent to glandular swellings" (Ph. Ind.).

An essential oil obtained from the leaves by distillation at Samarang, by Herr Schmity, has been credited by him with having given good results in the treatment of catarrhal disorders and as an antiseptic, and the claim has been confirmed in the experience of Dr. Kleinstuck, of Jena (Ph. J., Oct. 2, 1886, p. 268, also Ph. J. for 20th Nov., 1889, p. 423).

In the Konkan, the fruit is employed with honey as a remedy for cough, and in Orissa, the root is said to be used to prevent child-bearing.

" The juice of the leaves is dropped into the eye in painful affections of that organ ; it is also used to relieve cerebral congestions and satyriasis, and to allay thirst (Dr. Thompson, in Watt's Dict.)." The juice of the leaves is dropped into the eye in night-blindness (B. D. Basu).

Messrs. H. H. Mann, D. L. Sahasrabuddhe and V. G. Patwardhan of Poona have published in *Memoirs of Depart. of Agric. in India*, for July, 1913 and June 1916, their

interesting studies in the chemistry and physiology of the leaves of the Betel-Vine. According to them—

The younger leaves on the plant contain much more essential oil, much more diastase, and much more sugars than those which are older. On the other hand, the tannin does not vary in this direction. The leaves both on the middle branches and on the middle part of the main vine contain slightly the largest quantity of 'tannin.' * * * *

Nearly all the work done (except that of Eykman) has been done in Europe on dried leaves—and all, except the original preparation of Kemp, on Java or Siam oils. Our results differ considerably from those published hitherto, and we will simply indicate those which we have obtained.

As to the conclusions regarding the essential oil of betel-leaf, they say—

The essential oil of betel-leaf consists essentially of two portions, consisting respectively of phenols and of terpene-like bodies. The relative proportion of these varies, and the higher the quality of the leaf, the higher the proportion of phenols in the essential oil. The proportion of phenols in our samples varied from 42 per cent. (Poona) to 70 per cent. (Ramtek *kapuri*) in green leaves of the light green variety, and from 33 per cent. to 45 per cent. in green leaves of the dark green variety. The bleaching of the leaves not only increases very much the total quantity of the essential oil, but also the proportion of the phenols in it. In two cases where bleaching was carried out, the increase in the percentage of phenols was from 17 to 33 per cent.

The phenols consist essentially of eugenol in all our cases, mixed with a small percentage of betel phenol. The latter can be largely separated by washing the phenols with water in which it is very much more soluble than eugenol. No sign of any substance having the properties attributed to chavicol has been found in any of our samples.

The nonphenolic portion of the essential oil is a mixture of a number of substances as yet uninvestigated. Over 60 per cent. boils between 240° and 255°C. This has a light green colour, and a somewhat objectionable smell. It is not cadinene or caryophyllene.

They conclude their interesting studies as follows :—

We have shown the character of the leaf which is required for chewing, and have found more clearly than ever that it is the quantity, and also the character, of the essential oil which seems most largely to determine the value of any sample of betel vine leaf for this purpose.

The essential oil itself, however, is not always the same. It consists of a mixture of certain phenols and of certain terpene-like constituents. As far as the phenols are concerned, eugenol is always the chief constituent in Indian oils, mixed with a small quantity of betel phenol. We have never found chavicol in Indian oils. The best essential oil, from a point of view of public taste, is that which contains as large a proportion of phenols as possible. Those varieties of leaf which give an essential oil containing much terpene, are very pungent, but are looked upon as very coarse. Bleaching not only

increases the amount of essential oil in the leaf, but also increases the proportion of phenols in the essential oil. The nature of the terpene-like constituents is still unknown, but will be investigated at the first opportunity.

1082. *P. nigrum*, Linn., H.F.B.I., v. 90; Roxb., 51.

Vern.:—Golmirch, kâli-mirch, habsh, choca mirch, white form=saféd-mireh (Hind.); Muricha, kâlâ-morich, gôl-morich (Beng.); Spôt (Bhote); Martz (Kashmir); Gol-mirch (Pb.); Dârugarm, daurgarm, march (Afg.); Gûlmirien (Sind); Miri, kalamiri, white form=saféd-miri (Bomb.); Kâlimirch, miré (Mar.); Kâlâmari, kâlo-mirich, miri (Guz.); Choca, kali mirchingay, Milâgu (Tam.); Miryâla tîge, miriyâlu (Tel.); Menasu, kare menasu, molû-vukodi, mirialu (Kan.); Lada, kuru mulaka (Malay).

Habitat:—Native in the forests of the Circars and of Assam and Malabar; cultivated in hot damp parts of India.

A stout climber. Branches trailing and rooting at the nodes, terete, quite glabrous. Leaves coriaceous, 5-7 by 2-5 in., sometimes glaucous beneath, usually broadly ovate, oblong or nearly orbicular; base acute, rounded or cordate, equal or unequal, nerves stout, alternate, 2-3 pair basal, with another pair higher up which run to the tip (J. D. Hooker). Supra-basal nerves, says Brandis, usually alternate. "Basal nerves 3-5." Petiole $\frac{1}{2}$ -1 $\frac{1}{2}$ in., stout. Bracts of female short, cupular, wholly adnate, without raised margins. Flowers usually dioecous, but often the female bears 2 anthers or the male a pistillode. Anthers 2-celled. Fruiting spikes loose, glabrous, variable in length and robustness, slightly interrupted, drooping 4-6 in. long (Brandis). Fruit globose, sessile, red when ripe; pulp thin.

Uses:—It is officinal in both Pharmacopeias, and its uses are too well known to be mentioned here.

N. O. MYRISTICÆÆ.

1083. *Myristica malabarica*, Lamk., H.F.B.I., v. 103.

Vern.:—Kanagi (Kan.); Pindi-kai (seeds), rânajayaphala, jangli-jâyaphal, Kâiphâl (Bomb.).

Habitat:—The Concan, Canara and N. Malabar.

A large, nearly glabrous tree. Wood reddish-grey, moderately hard. Branchlets nearly smooth, slightly ribbed. Leaves 4-8 in. by $1\frac{1}{2}$ -4 in., linear-oblong or elliptic-lanceolate, sub-acute, glaucous beneath, thinly coriaceous on the flowering branches, thick and leathery on the fruiting, more or less shining above, nerves 8-14 pair, very slender; petiole $\frac{3}{4}$ -lin. Male panicles sub-cymose, bracteolate, 1-1 $\frac{1}{2}$ in., axillary or supra-axillary; peduncles naked below, sub-umbellately cymose above; bracteole an orbicular scale. Perianth $\frac{1}{2}$ in., puberulous globose, 3-toothed; anthers 10-15, connate, in a cylindric, shortly stipitate column. Female panicles few-fid; flowers larger. Fruit 2 by lin., rusty, brown, pubescent, narrowly oblong, aril yellow, completely enclosing the seed (J. D. Hooker and Brandis).

Uses:—"It yields a variety of nutmeg (Malabar or false Nutmeg?), larger and much longer than the officinal nutmeg, and possessing little of its fragrance or its warm aromatic taste. When bruised and subjected to boiling, it yields a considerable quantity of a yellowish concrete oil, analogous to expressed oil of nutmeg, which has been represented to the Editor as a most efficacious application to indolent and ill-conditioned ulcers, allaying pain, cleansing the surface and establishing healthy action. For this purpose it requires to be melted down with a small quantity of any bland oil. It may be found serviceable as an embrocation in rheumatism. (Ph. Ind., p: 190.)

The seeds in the form of a *lep* are used as an external application in Bombay. (Dymock.)

"The *arillus jáyapatri* is considered to be a nervine tonic and is used in stopping vomiting," (Dr. Peters in Watt's Dic.)

The dried juices from the bark of several Asiatic species of *Myristica* show but little difference from officinal Malabar Kino. The crude, inspissated, fresh juice from the *Myristica* species differs by containing crystalline calcium tartarate suspended in, and depositing from it. This distinguishes it from all the other kinos of commerce. (Edward Schaer, Ph. J. Trans. 1896.)

The seeds contain 40.7 per cent. of fat, and the mace 63.2 per cent., in each case the fat is associated with a red resin. Bombay mace differs entirely in its composition from that of genuine mace (*M. fragrans*, Houtt.). According

to Arnst and Hart (1893), the former contains 61.05 per cent. of fat and only 0.27 per cent. of essential oil, while the latter contains only 26.78 per cent. of fat and 4.12 per cent. of essential oil.

This difference is observed not only in the composition of the crude material, but also in the characters of the separated fats. E. Spaeth in 1895 determined the constants of the fat from the Bombay mace and compared them with those of genuine Banda mace, with the following results:—

	Bombay.	Banda.
Melting point	31°	25° to 26°
Iodine value	51.3 to 53.5	78 to 80
Saponification value	189.4 to 191.4	170 to 173

It would seem that both these fats contain myristin and olein in varying proportions. (Agric. Ledger, No. 3 of 1907.)

N. O. LAURINEÆ.

1084. *Cinnamomum Tamala*, Fr. Nees, H.F.B.I., V. 128.

Vern.:—Dālchīni, kirkiria, kakra, talisputar, silkanti (Hind.); Chotā sinkoli (Nepal); Nupsor (Lepcha); Dopatti (Ass.); Zarnab (Arab.); Tejpāt (Dec.); Talisha-pattiri (Tam.); Talishapatri (Tel.).

N.B.:—"The word *tamali* occurs in the *Rāja Nighantu*, and *tejpāt* is apparently derived from the Sanskrit *trach*" (Watt).

Habitat:—"Tropical and sub-tropical Himalaya, from near the Indus to Bhotan and Sikkim, Silhet and Khasia Hills.

A moderate-sized, very aromatic, evergreen tree. Bark thin, compact, brown, wrinkled, with an aromatic taste. Wood reddish-grey, splits and warps, moderately hard, close-grained, scented. Leaves usually 4-5 in. long, very variable in breadth, glabrous, 3-nerved, opposite or nearly so, often alternate on the same branch. Petiole $\frac{1}{2}$ in. long; the young foliage pink. Flowers $\frac{1}{4}$ in. diam.; perianth silky, of 6 unequal lobes, in fruit breaking off transversely about the middle. Fruit black when ripe, succulent, $\frac{1}{2}$ in. long, supported by the thickened pedicel at the base of perianth with short truncate teeth. The lobes are ribbed longitudinally. "Perfect stamens 9, the 6 outer eglandular with 4-celled anthers opening inwards, the inner 3 with 2-glands at the base, and 4-2-celled anthers

opening outwards, innermost or fourth series of 3 short staminodes. Ovary free. Style filiform" (Kanjilal).

Uses :—In the Punjab, the leaves are used in rheumatism, being considered stimulant; also in colic and diarrhoea. The bark is given for gonorrhœa. "Given in decoction or powder in suppression of lochia after childbirth, with much benefit." (Dr. Ratton, in Watt's Dict.)

Mr. D. Hooper writes :—"In collecting barks from wild trees belonging to the genus *Cinnamomum*, an inexperienced native is likely to mistake the species of *Litsaea* for the proper tree. The fragrant bark of the species of *Litsaea* is something like Cinnamon, but is very poisonous, as it contains an alkaloid which acts on the muscular system like strychnine."

The leaves contain an essential oil of a lemon-yellow colour, and a clove-like peppery odour. Sp. Gr. at 15° C, 1.0257; phenol content 78 per cent.; soluble in 1.2 volumes and over of 70 per cent. alcohol. It is closely allied to the ordinary oil from Ceylon cinnamon leaves. (J. Ch. I. for 15th June, 1910 p. 715.)

1085. *C. obtusifolium*, Nees., H.F.B.I., v. 128.

Syn. :—*Laurus obtusifolia*, Roxb. 339.

Vern. :—Tejpat, ramtejpat, kinton (Beng.); Phat-goli (Kumaon); Bara singoli (Nepal); Nupsor (Lepcha); Patichanda (Ass.); Dupatti (Mehi.); Krowai (Magh.); Looleng-kyaw (Burm.).

Habitat :—Central and Eastern Himalaya; Nepal, Sikkim, Assam, Silhet and the Khasia Hills.

An evergreen tree. Bark grey, moderately hard, shining. The bark of the roots resembles cinnamon (Gamble). This is a large robust plant, the largest-leaved of the Indian species. Leaves quite glaucous beneath, elliptic oblong, obtuse, acute or acuminate, 3-nerved, nerves not impressed above; nervules faint or distinct; petiole short, robust. Flowers small, $\frac{1}{4}$ in. diam., often crowded at the ends of the much-branched, crowded panicles, with long peduncles. Perianth sub-silky, pubescent; lobes persistent in fruit. Stamens and ovary sparsely hairy or glabrous. Fruit small, ellipsoid or sub-globose, $\frac{1}{8}$ - $\frac{1}{2}$ in. long, succulent. Peduncle and calyx $\frac{1}{8}$ - $\frac{1}{2}$ in. long, the latter $\frac{1}{4}$ in. broad in fruit.

N. B.—Col. Beddome, Dr. Dymock and others believe this to be a variety of *C. Zeylanicum*.

Uses:—Dr. Kurz says the aroma of the bark is variable, and the bark of the root of the Martaban plant is as aromatic as the best Ceylon cinnamon. Dr. Gimlette says in Nepal, the bark is used in dyspepsia and liver diseases.

1086. *C. iners*, *Leimv.*, H.F.B.I., v. 130, Roxb. 338 (under *Laurus nitida*).

Vern.:—Jangli-dârchini (Hind.); Kattu-karurâf pattai (Tam.); Adavi-lavanga-patta (Tel.); Sikivabo, looleng-kyaw (Burm.).

Habitat:—Tenassarim, Mergui, etc.

A large tree. Bark grey, smooth, with horizontal, wavy bands, $\frac{1}{4}$ – $\frac{1}{2}$ in. thick. Wood light, yellowish-brown, moderately hard, shining, smooth, scented (Gamble). Branchlets nearly glabrous. Leaves opposite, as a rule, glabrous, very variable in breadth, 3–8 in. lanceolate, oblong or linear-oblong, rarely ovate and rounded at base, shining above, 3-nerved, nerves continued up to the tip; sometimes acute at base. Panicles slender, long peduncled, often exceeding the leaves, silky, pubescent. Flowers about $\frac{1}{10}$ in. long. Fruiting perianth rather spreading when dry, $\frac{1}{2}$ in. diam.; lobes persistent. Fruit $\frac{1}{2}$ in. long, base sunk in the perianth.

Uses:—Dr. Kurz remarks that he does not know in what this species should differ from the true Cinnamon. The inner bark possesses in the fresh state a powerful cinnamonic odour and taste, and by careful drying and preparation appears capable of affording *Cassia ligna* of good quality. The seeds, bruised and mixed with honey or sugar, are given to children in dysentery and coughs, and combined with other ingredients in fevers.

Sir George Watt writes:—"It would seem probable that much of the economic information given in works on Economic Botany, under this species, should be transferred to the *C. Zeylanium* of Western and Southern India."

1087. *C. zeylanicum*, *Breyn.*, H.F.B.I., v. 131.

Syn.:—*Laurus cinnamomum*, *Roxb.* 336.

Vern.:—Dālchīnī (H.); Karuwā (Tām.); Sanalingu (Tel.); Lavanga-patte, dāla-chīnī (Kan.).

Habitat:—Deccan Peninsula; also Burma, Malay Peninsula and Ceylon.

A large tree, all parts very aromatic. Bark brown rough, $\frac{1}{2}$ to $\frac{3}{4}$ in. thick. Wood light-red, moderately hard. Leaves, as a rule, opposite, thick, coriaceous, glabrous, upper side shining, underside dull, 3-5 basal nerves. Young foliage pink. Panicles as long as or not much longer than the leaves, sometimes terminal. Flowers grey-silky, $\frac{1}{2}$ - $\frac{1}{3}$ in. diam. Fruit dark-purple, elongate, ellipsoid, $\frac{2}{3}$ -lin. long, supported by the much enlarged perianth.

Use:—The bark is officinal in the British Pharmacopeia.

Three oils are obtained from *C. zeylanicum*: the bark yields essential oil of cinnamon, to the extent of $\frac{1}{2}$ to 1 per cent.; from the leaves is expressed a brown viscid essential oil, sometimes exported from Ceylon as "Clove Oil" (it has a somewhat similar medicinal value to the true oil of cloves); and from the root a yellow oil which is specifically lighter than water and has a strongly camphoraceous flavour. In their report for April-May, 1904, Schimmel & Co. discuss several reactions for distinguishing between Ceylon cinnamon oil and cassia oil, with which the former is not infrequently adulterated. [Cf. Gildemeister and Hoffmann, Volatile Oils, 1900, 377-92.]

1088. *C. macrocarpum*, Hook., H.F.B.I., v. 133.

Vern.:—Karna, bahena, tikhi (Malayalam).

Habitat:—North Kanara.

An evergreen shrub. Branches slender. Wood rather thinly coriaceous, very faintly reticulate beneath. Leaves 5-8 in. long, $1\frac{1}{2}$ -3 in. broad, oblong-lanceolate, 3-5-nerved, lateral nerves $\frac{2}{3}$ in. above the base. Petiole $\frac{3}{4}$ -lin. Panicles shorter than the leaves. Fruiting peduncle long, slender for the size of the fruit, which is much the largest of the genus. Fruiting perianth apparently fleshy together with the thickened pedicel nearly lin. long, broadly funnel-shaped, very shortly 6-toothed. Fruit lin. long, globosely oblong.

Use:—From the root bark, as also the leaves, an oil is prepared and used as an external medicine (Rheede).

1089. *C. glanduliferum*, Meissn., H.F.B.I., V. 135.

Vern.:—Malligiri, marisgiri (Nepal); Rohu (Lepcha); Gunserai (Assam); Gundroi (Cachar).

Habitat:—Central Himalaya, from Nepal and Kumaon, eastward to Assam, Khasia Hills and Sylhet.

A tree with branches, stout, smooth, black when dry. Leaves very variable, 3-5 in., alternate, elliptic or lanceolate, caudate, acuminate, penni-nerved, thickly coriaceous, often glaucous beneath, brown when dry; nerves erecto-patent; petiole $\frac{1}{2}$ -lin., slender. Panicles axillary, 2 in. long; peduncle very slender, glabrous; flowers very shortly pedicelled, $\frac{1}{8}$ in. diam., sparsely pubescent without, villous within. Stamens hairy. Ovary glabrous.

Use:—The wood may be used as a substitute for Sassafras. It seems worthy of more attention than has been awarded to it. (Ph. Ind.)

1090. *C. Parthenoxylon*, Meissn., H.F.B.I., V. 135.

Syn.:—*Laurus porrecta*, Roxb. 340.

Vern.:—Kayo-gadis (Mal.).

Habitat:—Malay Peninsula, from Tenasserim to Penang.

A large tree. Branches stout, black when dry, with very smooth bark. Leaves alternate, elliptic, ovate or oblong, subcaudate-acuminate, penni-nerved, often glaucous beneath, extremely variable, the largest 8 by 4 in., coriaceous; others thinner, almost membranous and glaucous beneath; base acute; nerves spreading, the lowest pair sometimes longest. Petiole slender, 1-1 $\frac{1}{2}$ in. Panicles 1-3 in. long, with the young shoots enclosed in round, coriaceous, silky, caducous scales, black when dry, many-fid. Flowers $\frac{1}{10}$ in. diam., pedicelled. Perianth nearly glabrous without, pubescent within; stamens very short, hairy. Ovary glabrous. Stigma discoid. Fruiting perianth $\frac{1}{4}$ - $\frac{1}{3}$ in. long, funnel-shaped, suddenly expanding into the fruit-bearing disk; lobes broadly oblong, wholly deciduous. Fruit $\frac{1}{2}$ in. diam., globose, succulent.

Use:—The fruit yields an oil used in rheumatic affections. An infusion of the root is also employed as a substitute for Sassafras.

1091. *Actinodaphne Hookeri*, Meissn., H.F.B.I., v. 149.

Vern.:—Pisi (Bomb.).

Habitat:—A small tree or shrub of Sikkim, and of the Eastern and Western Gháts of South India and in Kanára and Sattára, and particularly at Mahábaleshwar.

A moderate-sized tree in evergreen forest. Bark light-brown, smooth. Wood light-brown, moderately hard, even-grained. Branchlets and young leaves usually densely, softly, rusty-tomentose or villous. Buds large, silky. Leaves whorled, coriaceous, elliptic, ovate-lanceolate, finely acuminate, glabrous and shining above, but often tomentose beneath when full grown; blade 5-7 in., petiole $\frac{1}{2}$ - $\frac{3}{4}$ in.; secondary nerves 6-8 pair, the lowest pair often extending almost to the middle of the leaf. Clusters of female flowers sessile. Fruit ellipsoid, seated on the campanulate, entire perianth-tube.

Uses:—A cold infusion of the leaves is mucilaginous, and is used in urinary disorders and in diabetes. The oil of the seeds, *Pisa-tela*, is used as an external application to sprains; it is of a reddish colour, and has a fatty odour. (Dymock.)

1092. *Litsea sebifera*, Pers., *Var. sebifera proper*; H.F.B.I., v. 158.

Syn.:—*Tetranthera apetala*, Roxb, 734.

Vern.:—Garbijaur, singrauf, medh, ménda, bark=maidá-lakrí (Hind.); Kúkúr chita, ratún, garur, bark=maidá-chhál (Beng.); Suppatnyok (Lepcha); Medasak, chandna, gwâ, riân, medachob, bark=méda-lakri, maidasak (Pb.); leaves=chickaná (Bomb.); bark=Mirio (Goa); Maida-lakadi (Mar.); mushaippé-yetti, pishin-pattai (Tam.); Narra alagi, nara mamidi, meda (Tel.).

Habitat:—Widely distributed throughout India.

A moderate-sized evergreen tree, 20-50 ft., very variable in foliage and inflorescence. Bark 1 in. thick, brown. Wood greyish-brown or olive-grey, moderately hard, shining, close and even-grained. Inner bark viscid. Branchlets and inflores-

cence more or less pubescent, sometimes almost glabrous. Leaves subterminal on branches, alternate, 3-6in., thin oblong glabrous above, sparingly pubescent beneath; tip acute, obtuse or rounded; nerves 8-10 or 12 pair, joined by finely reticulate veins. Petiole $\frac{1}{2}$ -2in. long. Flowers in umbels, corymbose or racemose, usually long pedicelled, few or many, $\frac{1}{4}$ in. before opening, white or yellowish; perianth very incomplete, or 0. Pedicels clustered on a stout or slender common Peduncle, $\frac{1}{4}$ -3in. long. Bracts 4, more or less tomentose. Stamens 9-20 or more, filaments clothed with long, soft hairs. Fruit $\frac{1}{4}$ in. diam., pea-sized, globose, on the small thickened perianth-tube.

Uses :—The feebly balsamic, mucilaginous bark is one of the best known and most popular of native drugs. Dymock states that it does not appear to have been mentioned by Sanskrit writers, and is only briefly noticed in Muhammadan works. He considers it probable that the drug has been adopted by Muhammadan physicians in India as a substitute for an Arabian drug, called *Maghath*, the botanical source of which is uncertain. At the present time it is largely employed as a demulcent and mild astringent in diarrrhœa and dysentery. According to Irvine, it is also esteemed as an aphrodisiac in Patna. Fresh ground, it is used either dry, or triturated in water or milk, as an emollient application to bruises, and as a styptic dressing for wounds. It is also supposed to be anodyne, and to act as a local antidote to the bites of venomous animals.

The oil from the berries is used in rheumatism; the leaves are mucilaginous and have a pleasant odour of cinnamon (Watt).

Chem. comp.—This bark, an authentic specimen of which was supplied by Mr. Hollingsworth of the Madras Medical College, gave, on an air-dried sample, 4.6 per cent. of ash, and 14.2 per cent. of alcoholic extract, affording very strong reactions with alkaloidal tests. On separating the alkaloid, it was found to agree with the characters of Laurotetanine, an alkaloid which has been discovered by M. Greshoff in three species of *Litsæa* in Java, and in several other plants of the natural order Laurineæ. Laurotetanine is crystalline, and has a strong tetanic action on animals; it is sparingly soluble in ether, more readily in chloroform. It is precipitated by sodium carbonate from solutions of its salts, but readily redissolves in an excess of potash or soda, and is precipitated by the usual alkaloidal reagents.

It gives a dark indigo-blue coloration with Erdmann's reagent, a pale rose-red with pure sulphuric acid, and a reddish-brown with nitric acid. A base, which seems to be identical with laurotetanine, is also found in the varieties of *Tetranthera*, *Notophoebe*, *Aperula*, *Actinodaphne* and *Illigera pulchra*. It is also possible that Laurotetanine is the alkaloid discovered in 1886 by Eijkman in *Haasia squarrosa*, Z. et M. (Meded. uit S'Lands Plantentuin, vii, p. 77-101.)—(Pharmacog. Ind, III., 212.)

The seeds yield a solid white fat called in Java Tang kala fat. The fat melts at 42° and has acid values ranging from 3.3 to 8.8; specific gravity at 41°, 0.9734; saponification value, 268.2; iodine value 2.28; Reichert-Meissl value, 1.47; Hehner value, 76.1. The fat appears to contain olein 2.6, laurin 96.0 per cent. (A. Schroeder, *Archiv. Pharm.*, 1905, 243, 628.)

1093. *L. polyantha*, Juss., H.F.B.I., v. 162. Roxb. 735.

Vern. :—Meda, gwa, singraf, sangrav, marda, kat marra, kakúri, kerauli, patoia, katmoría, papria, katmedh, kari, rand-kari (Hind.); karkawa, karka (Dehra Dun); Boro kúkúr-chita (Beng.); Pojo (Santal); Sualu (Assam); Huara (Kachar); Ratmanti, kadmero (Nepal); Suphut (Lepcha); But, mugasong (Michi); Bolbek (Garo); Mendah, kari, kjera, toska, leja. (Gond.); Leinja (Kurku); Rian, gwá, harein, bark=meda lakri (Pb.); Ranamba (Mar.); Nara mamúdí, nara (Tel.).

Habitat :—From the Punjab and the Salt Range along the foot of the Himalaya, eastwards to Assam, and southwards to the Satpura Range.

A middle-sized evergreen tree. Bark dark-grey, smooth when old, exfoliating in corky scales. Wood olive-grey, soft, not durable, is readily attacked by insects. Branchlets under-side of leaves and inflorescence, with soft brown or rust-coloured pubescence. Height of tree 20-40ft. Branches rather stout. Leaves extremely variable, the largest (Ava; Wallich) 16 by 9in., usually rusty brown when dry, rarely green, glossy above; nerves strong beneath, 8-10 pair, joined by parallel transverse veins, petioles $\frac{1}{2}$ -lin. Male flower heads $\frac{1}{8}$ - $\frac{1}{2}$ in. diam. before opening in sessile or nearly sessile clusters. Flowers 5-6 in each head, sessile or on short hairy pedicels. Involucre of 5 rounded membranous bracts. Fruit $\frac{1}{4}$ in. ovoid, long seated on the persistent base of the perianth. Ovary in

male flower O or with a slender style and small stigma. Stamens 9-13, filaments hairy.

Uses:—Ainslie writes: "The bark is mildly astringent, and has a considerable degree of balsamic sweetness." "It is used by the hill people in the cure of diarrhœa." Stewart writes:—"The bark with that of *Tetranthera Roxburghii*, *Nees* (*Litsæa sebifera*, *Pers.*, *var.* proper) is officinal, being considered stimulant, and after being bruised, applied, fresh or dry, to contusions, and sometimes mixed with milk and made into a plaster." Campbell confirms the above, writing: "The powdered bark is applied to the body for pains arising from blows or bruises, or from hard work; it is also applied to fractures in animals." The seeds yield an oil which is used medicinally. The medicinal properties above enumerated are very similar to those of the better-known, and more largely employed, *L. sebifera*, *Pers.*, the venacular names for which also strongly resemble—and, indeed, in certain dialects are identical with—those of this species.

1094. *L. Stocksii*, *Hook.*, H.F.B.I., v. 176.

Vern.—Pisi (Mar.).

Habitat.—The Concan and Canara, on the Ghats and Mahableshwar Hills.

A large tree, glabrous, except the brown velvety inflorescence, and very minute hairs occasionally on underside of leaves; branches stout. Bark smooth, greyish-brown. Wood yellowish-grey, moderately hard. Leaves 1-2in. broad, 1-2in., often of a purplish or brown glaucous hue beneath, greenish above with impressed nerves, coriaceous, elliptic, oblong or oblanceolate, alternate, rarely ovoid, acute or acuminate, very finely, but distinctly, reticulate and sometimes puberulous beneath, with 10-13 pairs of strong nerves; petiole $\frac{1}{8}$ - $\frac{1}{2}$ in. Female umbels shortly pedicelled; flowering nearly $\frac{1}{2}$ in. diam., 6-8-fid, in stout sub-erect racemes, 1-3in. long. Male heads $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. before opening. Perianth grey-silky. Perianth-tube oblong, turbinate in flower. Stamens (of female) reduced to 2 glands and a ligule. Fruiting umbels sometimes solitary or corymbose.

Fruit ellipsoid (unripe), $\frac{1}{2}$ in. long, seated on the entire or irregularly lobed, turbinate, thickly pedicelled perianth tube.

Uses:—A cold infusion of the leaves is mucilaginous, and is used in irritation of the bladder and urethra. The oil of the seeds, *Pisa-taila*, is used as an application to sprains and itch (Pharmacog. Ind. Vol III., p. 213).

Chem. comp.—The dried and powdered red fruits of this tree yielded to ether 31.6 per cent. of extract consisting mainly of crystalline fats. Petroleum ether separated this extract into a soluble fatty portion, and an insoluble neutral reddish resin. The petroleum ether solution left on evaporation some fatty acids melting at 33° and solidifying at 35° , but which, on crystallization from boiling alcohol and pressure between filtering paper, afforded some purely white crystals melting at 42.5° . The fatty acids would appear to consist of lauric acid with a small admixture of oleic acid.

The resin in the fruits was associated with a volatile oil to which the fragrance is due. The alkaloid detected in the spirituous and the watery extracts of the drug had the reactions of laurotetanine. The dried fruits left after ignition 4.77 per cent. of mineral matter.

The seeds contain 31.6 per cent. of fat extracted by ether. The fat melted at 39° and afforded white crystals melting at 42.5° , consisting of lauric acid.

1095. *Lindera Neesiana*, Benth., H F.B.I., v. 186.

Habitat:—Temperate Himalaya; Nepal and Sikkim,

A middle-sized very aromatic tree, deciduous, quite glabrous, excepting the hairy pedicels. Shoots terete, smooth, quite black when dry, often very stout. Leaves 3-7 in., membranous, ovate or lanceolate, acute or acuminate. Petiole slender, $\frac{1}{4}$ -1 in. Basal nerves three, short, not reaching the middle of the leaf. Umbels unopened, globose, $\frac{1}{2}$ in. diam., solitary or clustered, on slender pedicels, $\frac{1}{6}$ - $\frac{1}{2}$ in. long. Bracts, outer membranous, glabrous, hemispherical; inner narrower. Flowers on tomentose pedicels, $\frac{1}{4}$ in. diam., green, 5-7 flowers in each head. Sepals orbicular, nearly glabrous, very membranous. Stamens 9, filaments short, glabrous, seated on the unaltered 6-lobed perianth.

Use:—Yields excellent Sassafras (Kurz).

1096. *Cassytha filiformis*, Linn., v. 188; Roxb. 342.

Sans.:—Akás Valli.

Vern.:—Amarbeli (H.); Akásbel (B.); Alagjari (Santal); Akáswel, Amarvélla (Mar.); Kotan (Duk.); Cottan (Tam.); Paunch figa (Tel.); Acatsjabulli (Mal.).

Habitat:—From Banda to Bengal, and Chittagong and southwards to Travancore.

A filiform, twining, parasite, adhering to the host by suckers, quite glabrous; young parts puberulous. Stems slender. Branches numerous, forming a web of leafless cords over bushes. Spikes $\frac{1}{2}$ -2 in. Bracts rounded, ciliate. Perianth twice the length of the rounded, ciliate bracteoles. Perianth segments, outer sepals small, rounded ciliate; inner much longer, oblong or ovate. Fruit glabrous, globose, succulent, smooth (not ribbed), the size of a pea, crowned with perianth-lobes.

Uses:—Sanskrit writers describe it as a tonic and alterative, and regard it as possessing the power of increasing the secretion of semen. (U. C. Dutt.)

The drug consists of the slender thread-like stems of the plant. It has a mucilaginous taste, but no odour. It is employed in Mauritius in the form of decoction for intestinal derangement and as a tonic for scrofulous and rachitic infants. This is another eastern remedy whose use extends to Madagascar. In India, the powdered plant mixed with sesamum oil is used to strengthen the hair, and by the Brahmins for cleansing inveterate ulcers, for which purpose it is mixed with butter and ginger. The juice mixed with sugar is considered a specific in inflamed eyes. (Treas. Bot., p. 234.) Its properties are probably due to a mucilage. (Ph. 1. 12. 8. 82, p. 122.)

Chem. comp.—M. Greshoff has detected an alkaloid in this plant, having the following colour reactions: sulphuric acid faint red, Eardmann's reagent (sulphuric acid mixed with a little nitric acid) blue, nitric acid red-brown, Fröhde's reagent dirty blue. Dr. Greshoff believes that on a closer investigation of this alkaloid, it will be found to be identical with laurotetanine described under *Litsæa sebifera*. (Pharmacog. Ind. III. 216.)

N. O. THYMELACCEÆ.

1097. *Daphne oleoides*, Schreb., H.F.B.I., v. 193.

Syn.:—*D. mucronata*, Royle.

Vern.:—Pech (Sind) ; Kutilāl, kanthan, gāndalūn, mæshūr, shalangrī niggi, channī zhi, kak, zosho (Pb.) ; Laghūne (Afg.).

Habitat:—Western Himalaya, from Garhwal westwards to Murree and the Sulaiman Range.

A small, much-branched shrub. Bark grey, with occasional prominent, horizontal lenticels. Wood white, soft. Young shoots pubescent. Branches green-brown or purple, pubescent or glabrate. Leaves sub-sessile, lanceolate or linear-lanceolate, very variable, coriaceous ; midrib prominent, terminating in a sharp mucro. Flowers white, with a pink tinge, slightly seen to in terminal heads of 3-9 flowers. Perianth-tube $\frac{1}{2}$ in. long, outside densely tomentose, inside glabrous. Ovary pubescent. Fruit orange or scarlet, dry or rather fleshy, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, ellipsoid.

Uses:—Aitchison, in his *Flora of Kurram Valley*, says that the roots of this plant are used internally, after boiling as a purgative. He, in another place, says : “Camels will not eat this shrub except when very hungry. It is poisonous, producing violent diarrhœa. I feel certain that much of the mortality of camels in the Kurram division was due to the prevalence of this shrub.”

The bark and leaves are used in native medicine. The berries are eaten to induce nausea. Stewart refers to this plant as hurtful to camels, making the same observation as was made by Aitchison in Kurram. He further says : “The bark is used by women in Kanâwar for washing their hair,” and adds that it has been tried for paper-making. The bark and leaves are used in cutaneous affections and, on the Chenab, the leaves or an infusion are given for gonorrhœa and applied to abscesses. (Stewart.)

1098. *Wikstroemia Indica*, C. A. Mey. H.F.B.I., v. 195.

Syn.:—*Daphne Viridiflora*, Wall.

Habitat:—Chittagong, Tenasserim, Singapore. Distributed to China, Mauritius, Philippines.

A glabrous shrub. Leaves 1-1½ in., sub-opposite, oblong, thinly coriaceous, oblong or obovate-oblong, tip rounded, base canate; brown when dry; nerves numerous, very slender. Flowers few, interterminal subsessile fascicles. Perianth ½ in. long, glabrous, greenish-yellow. Disk-scales usually united in pairs. Fruit ¼ in. long, ovoid, scarlet.

Uses:—In his Madagascar drugs, in Ph. J., 12th Aug., 1882., Mr. E. M. Holmes writes under *Hazomafanu*: "The pounded bark given in doses of 1 dram, mixed with salt and ginger, as a purgative. It probably possesses similar properties to *Daphne Mezereum*, and would be worthy of a trial as a substitute for it in the native materia medica." There is no record of the use of this drug in any part of India.

1099. *Lasiosiphon eriocephalus*, Dene., H.F.B.I., v. 197.

Vern.:—Ramethâ (M.); Râmi (Kan.); Naha (Sing.).

Habitat:—Deccan Peninsula; on the Ghats from the Concan southwards, ascending to 7,000 ft. on the Nilghiris.

A large shrub or small tree. Bark grey, rather smooth, inner bark fibrous. Wood white or yellowish-white, hard, much-branched. Branchlets usually purplish. Leaves 2-3 by ¾ lin., sub-sessile, lanceolate-oblong, opposite or scattered, not coriaceous; nerves very slender and oblique. Flowers thickly clothed with white or bluff, long, silky, villous hairs, in dense globose heads, 1-2 in. diam., supported by silky, involucre bracts, shorter than flowers. Perianth ½-¾ in. long, yellow; tube slender; lobes 4-5, oblong, obtuse; scales at its mouth very variable, alternating with the lobes, oblong or cordate, or bi-fid. Fruit dry, included in the lower persistent of the perianth (hollow receptacle).

Uses:—A powerful vesicant, but very uncertain in its action. A tooth-brush, made of the young branch, is said to cause falling out of the teeth (*Sakharam Arjun*). The bark is used to poison fish. In the Deccan the leaves are applied to contusions, swellings, etc. (B. D. Basu.)

Chem. com.—The fresh bark was beaten into a paste in a mortar, and the mass divided and placed in two bottles, one containing ether and the other spirit of wine; they were both shaken occasionally and the mixture allowed to macerate for 24 hours. The ether extract was filtered off and evaporated at a very low temperature until a thick, green, greasy substance was left. This was washed with warm water and a small piece placed upon the skin of the arm and spread, so as to cover a space the size of a rupee. In about two hours irritation of the skin was produced, and, on removing the covering of the arm, it was found that several small blisters had formed under the extract and extending beyond it. The alcoholic tincture was then removed by filtration and carefully evaporated under a gentle heat. The residue contained very little of the green-coloured resinous matter, but a large quantity of saccharine substance, which was non-crystalline. This extract was applied to the skin as in the previous experiment, but the application was followed by only a slight reddening due to the small amount of resin in the dried extract. The resin appears to be the source of the vesicating principle of the bark. It has an acid reaction in neutral solvents, is soluble in ammonia with a yellowish-brown colour, and is associated in the ethereal extract with a fatty base which facilitates its use as a blistering agent. (*Pharmacog. Ind.*, III, 226.)

1100. *Aquilaria Agallocha*, Roxb. H.F.B.I., V. 199; Roxb. 377.

Sans. :—Agaru.

The Sanskrit *agaru* (a privative, and *garu* heavy—a name given to it from the circumstance that it does not float on water) is the root from which most of its vernacular names have been derived. *Laghu* of *lauha*, another Sanskrit and Pali synonym, is supposed by some to be the origin of the expression Aloes-wood—and might therefore be accepted as denoting a light form that would float on water. (*Watt's Comml. Prod.*)

Vern. :—Agar (Hind.); Agaru, ugar (Beng.); Agare-hindi, ûd, aud, aude-hindi, ûde-hindi, agalugen (Arab.); Agre-hindî, agar (Pers.); Ud, ûd farsi (Pb.); Agara hindiagara (Bomb.); Agar (Guj.); Agar, aggalichanda (Tam.); Krishna agaru, agui, Kashtamu (Tel.); Sasi, sachi, bislatn (Ass.).

Habitat :—Eastern Himalaya; Bhotan; Assam; Khasia Mts.; Silhet and Tippera hills.

A tall, evergreen tree; young shoots, silky. Bark thin, tough and very even in surface and texture. "The bast," says Brandis, "when prepared, resembles parchment, and was used by the old King of Assam to write upon." Wood white, soft, even-grained, scented when fresh cut. In the interior of old trees

are sometimes found irregular masses of harder, much darker-coloured-wood, with a honey-like scent, which constitute the Aloe or Eagle-wood of commerce. Leaves 2-3½ in., thinly coriaceous, shining, caudate, acuminate; secondary nerves slender, with numerous, parallel, intermediate nerves; petiole ½ in. Flowers white, in many-fid; sessile or shortly peduncled, silky umbels; pedicels slender, ¼ in. long. Perianth persistent in fruit, ¼ in. long, silky without, densely villous within. Fruit thinly velvety, 1½-2 in. long, obovoid, thinly coriaceous.

Uses:—The fragrant resinous substance is considered cordial. It has been prescribed in gout and rheumatism. (Ainslie.) It is a delightful perfume, serviceable in vertigo and palsy, and the powder is useful as a restrainer of the fluxes and vomiting. In decoction, it is useful to allay thirst in fever. (Lourerio.) An essential oil prepared from the wood is also used medicinally. The wood is a preventive against fleas and lice, and in the form of a powder is rubbed into the skin and the clothes. In medicine, aloes wood is considered a stimulant and cordial in gout, rheumatism and paralysis, also as a stimulant astringent in diarrhoea and vomiting. It is taken internally as a tonic in doses of ten to sixty grains. Under the name of *agalocki*, Celsus ranks it among medicines which invigorate the nerves. The wood has long had a place in the *Materia Medica* of the Pharmacopœias of Europe, but it does not appear to possess any properties that call for its admission to modern local practice. (Pharmacog. Ind.)

N. O. ELÆAGNACEÆ.

1101. *Elæagnus hortensis*, M. Bieb., H.F.B.I., v. 201.

Vern.:—Sanjit (Afg.); Sirshing (Tibet); Shiùlik (U.P.); Botvir, Gangu (Kashmir).

Habitat:—Western Himalaya.

A small, deciduous tree or large shrub, 12-30 ft. high, often spinous, young, silvery. Bark light grey, thick, fibrous, smooth,

with deep longitudinal furrows. Wood soft to moderate hard; heartwood orange-brown; sapwood white. Branches dark brown. Leaves ovate-oblong or linear-oblong, silvery beneath, 1-3 in., obtuse; nerves faint, petiole $\frac{1}{4}$ in. Flowers 1-3-nate, pedicelled, yellow, fragrant. Perianth $\frac{1}{8}$ - $\frac{1}{4}$ in. long, silvery, campanulate above; teeth triangular, ovate; style glabrous. Fruit ellipsoid, oblong, $\frac{3}{4}$ in. long, red, dry or fleshy; endocarp thick, long, sweet and mealy when ripe.

Uses:—The flowers are reported to be medicinal. "The oil from the seeds with syrup, as a linctus recommended in catarrhal and bronchial affections" (Honnigberger, Vol. II. p. 273)

1102. *E. umbellata*, Thumb., H.F.B.I., v. 201.

Vern.:—Ghiwain, ghain, kankoli, bammewa (Pb.); Ginroi (Jaunsar).

Habitat:—Temperate Himalaya, from Kashmir to Nepal.

A thorny, deciduous shrub. Bark grey. Wood white, hard, even-grained, warps in seasoning. Branches numerous, often forming a dense bush. Branchlets and underside of leaves densely clothed with shining silvery scales, upperside bright green with scattered stellate hairs. Leaves 1-3 by $\frac{1}{2}$ - $\frac{3}{4}$ in., elliptic-lanceolate; blade $\frac{1}{2}$ in.; petiole $\frac{1}{4}$ in. long. Flowers white, exquisitely scented; axillary often fasciculate on the current year's branchlets appearing with or after the leaves. Upper portion of perianth slender tubular. Fruit ovoid or globose, $\frac{1}{2}$ in. long, succulent; endocarp ribbed, coriaceous, clothed inside with a dense felt of white hairs.

Uses:—The seeds are said to be used as a stimulant in coughs, the expressed oil in pulmonary affections, and the flowers as a cardiac and astringent. (Watt.)

1103. *E. latifolia*, Linn., H.F.B.I., v. 202.

Syn.:—*E. conferta*, Roxb. 148.

Vern.:—Ghiwain, mijhanla (Kumaun); Loharu (Garhwal); Jarila (Nepal); Guara (Beng.); Kamboong (Magh.); Kunkoe (H.); Shenshong (Garo Hills); Amgul, nurgi (Bomb.).

Habitat:—Subtropical and temperate Himalaya, from Kumaon to Sikkim; Bhotan and the Mishmi Hills; Khasia Mts.,

Bengal, at Comilla, Chittagong, Deccan Peninsula, from the Concan southwards.

A straggling shrub, climber or erect tree. Bark dark-brown, $\frac{1}{4}$ or $\frac{1}{2}$ in. thick, deeply cleft in vertical or spiral fissures and peeling off in thick plates. Wood light-yellow, moderately hard. Trunk sometimes 6 in. diam.; branches often spinescent. Leaves ovate-oblong, elliptic or almost rounded, obtuse or acute; blade 3-5 in.; petiole $\frac{1}{4}$ - $\frac{1}{2}$ in. long. Branchlets, petioles, under-side of leaves densely clothed with ferruginous or silvery, circular, dentate and lobed scales. Flowers male and bi-sexual, scented; pedicellate in few or many-fid, often pedunculate fascicles. Perianth clothed outside with silvery or ferruginous scales; in the fertile flower much constricted above the ovary. Fruit 1-1 $\frac{1}{2}$ in., ovoid-oblong, succulent, red or yellow pulp when ripe, edible. Endocarp ribbed, coriaceous, clothed inside with a dense felt or white hairs.

Uses:—The flowers are officinal in Sind and Punjab, and are considered cardiac and astringent. (Stewart.) Griffith says that fruit is used medicinally in Kashmere as an astringent. Very agreeable to taste.

1104. *Hippophæ rhamnoides*, Linn., H.F.B.I., V. 203.

Vern.:—Tsarap, tsarana, sirna, tsuk, tasru (Ladak, Piti and Lahoul); Dhûrchûk, târwâ, chûk, chuma (U. P.); Kâla bisa, bânt phût, amb, kando, milech, miles, suts, rul (Pb.).

Habitat:—North-Western Himalaya; in the beds of streams of the inner drier ranges, from Kumaon westwards.

A large, thorny, dioecious shrub, sometimes a small tree, with rigid branches, and silvery twigs and leaves. Bark grey, rough, with vertical furrows. Heartwood yellowish-brown, mottled, moderately hard, close-grained. Leaves short-petioled, alternate, $\frac{1}{2}$ -2 by $\frac{1}{10}$ - $\frac{1}{4}$ in., sub-coriaceous, glabrescent and dull-green above, felted with grey or rust-coloured, circular or irregularly indented scales beneath. Male flowers in axillary clusters on the old wood. Perianth with two opposite oblong segments, filaments short. Female flowers axillary, solitary, pedicelled.

Perianth tubular, 2-dentate. Fruit oblong or globose, orange-yellow, or bright-scarlet when ripe, enclosed in the succulent perianth. Seed dark-brown, shining.

Uses:—The natives of Kanâwâr are stated by Longden to eat it as a sort of *chatni*. As a *chatni*, it is recommended for lung complaints in a Tibetan Pharmacopœia.

The Siberians and Tartars make a jelly from these berries and eat them with milk and cheese, whilst the inhabitants of the Gulf of Bothnia prepare from them a sort of rob, which they use as a condiment with fish. * * In some districts of France a sauce is made from these berries and eaten with fish or meat. A decoction of them is said to be useful in cutaneous eruptions. * * The roots of the plant are long and straggling, and often assist in binding the loose sand on which it grows. (Sowerby's English Botany, Vol. VIII. p. 83.)

1105. *H. salicifolia*, Don. H.F.B.I., v. 203.

Vern.:—Ashûk (Nepal); Lhâla (Bhotan and Lepcha); Sûrch, suts, kâlâ bis, tserdkar, dhûrchuk, tarwa-chuk, chuma (Pb.).

Habitat:—Temperate Himalaya, from Jammu to Sikkim.

A willow-like shrub, 10-20ft. high, with lateral thorns. Very similar in appearance and hardly specifically different from *H. rhamnoides*. Bark dark-grey, brown, soft, $\frac{1}{4}$ in thick, cleft in deep vertical furrows and shallow cross ones into somewhat rectangular ones. Leaves membranous, glabrous or pubescent above, 2-4in., dull-green, linear-lanceolate, densely clothed beneath with white or rusty stellate hairs and some circular scales, so also are in the petioles and branchlets covered.

Use:—The fruit is employed in cases of lung disease. (Punjab Products)

N. O. LORANTHACEÆ.

1106. *Viscum album*, Linn., H.F.B.I., v. 223.

Vern.:—Turâpâuli (Afg.); Bhangrâ, bândâ, bamba, kahbang (Pb.); Bambal, wahal, ahalû (Pb.); Dibk (Arab.); Ban, banda

(H.); Chûlû-Kâ-Bânda (Jaunsar); Hurchu (Nepal); Perbika (Rawalpindi).

Habitat :—Temperate Himalaya, from Kashmir to Nepal.

A large, parasitic, leafy shrub, green all over. Branches dichotomous or whorled, jointed, terete. Leaves about 2 by $\frac{3}{4}$ in., sessile, very coriaceous, cuneate, oblong or oblanceolate, with 3 to 5 longitudinal basal nerves. Flowers dioecious, sessile in clusters of 3 to 5, supported by concave bracts. Perianth-segments 3-4, triangular, deciduous. Fruit $\frac{1}{2}$ - $\frac{3}{10}$ in. long, ellipsoid, white, smooth, almost transparent. Chiefly on rosaceous shrubs, such as apricot and on elm, walnut and willows. (U. Kanjilal.) Bird lime is made of the viscid pulp of the fruit. The parasite is also found on the Alder, Maple, Poplar, Olive and Mulberry. (Gamble.) Embryos sometimes 2-3 in. each; seed, terete, in fleshy albumen.

Uses :—Mr. Honigberger states that it is given by the Hakims in enlargement of the spleen, in cases of wound, tumour, diseases of the ear, etc. The dried berries imported into Bombay under the name of *Kishmish-i-kâwuliân* (vulg., *Kishmish kawli*) are probably obtained from this plant. The plant is used as a medicine in Lahoul. (Stewart.)

It contains a liquid volatile base, $C_8 H_{11} N$, with an odour resembling that of nicotine or of coniine. It forms a crystalline sulphate, a very deliquescent crystalline hydrochloride, and a more stable platino-chloride $(C_8 H_{11} N, HCl)_2 PtCl_4$, in yellowish, shining, micaceous scales, darkening at 230 °C. and melting, with decomposition, at about 250 °C. The base is extracted from the dry plant by means of 95 per cent. alcohol, acidified with 1 per cent. of hydro-chloric acid. After distilling off the solvent, the residual extract is made alkaline with sodium carbonate and distilled. The alkaline distillate is saturated with sulphuric acid, evaporated *in vacuo*, and the sulphate of the alkaloid crystallised in the usual manner. It also contains a viscachoutin, viscic acid, a glucoside, and a resinoid substance. (J. Ch. I. Jan. 31, 1908, p. 88.)

1107. *V. monoicum*, Roxb. H.F.B.I., v. 224; Roxb. 715.

Vern. :—Kuchle-kâ-malang (Hind.); Kuchlê-ki-sonkan (Dec.); Pullurivi (Tel.); Uchehichedi, Kâmaricham; Pulluri (Tam.); Kâsarakana-bandanige (Kan.); Pet chamra banda (Santal).

Habitat:—Sikkim Himalaya ; Khasia Mts.; Ganges Delta ; Oudh ; Nilghiri or Kurg hills.

A large, parasitic shrub. Branches dichotomous, leafy, terete, slightly swollen at the nodes. Leaves rather thin and usually drying black, 1-5in. long, very variable in breadth, petioled, obliquely ovate or falcate, acute or acuminate, 3-5 nerved ; nerves often strong. Flowers monœcious, in axillary, sessile or shortly peduncled fascicles, 1-3in., minute, greenish ; the lateral usually female, central male or absent, sometimes appearing spicate from terminating leafless shoots, deciduous. Bracts cuspidate. Perianth-lobes 3 or 4, triangular oblong. Fruit oblong, of the size of a pea ($\frac{1}{4}$ - $\frac{1}{2}$ in. long), truncate, smooth, yellowish (Kurz), "blackish-brown" (Brandis).

Mr. Duthie writes in his *Flor. Up. Gang. Pl.*, III. p. 65—

The Bundelkhand specimens collected by Edgeworth near Banda on *Zizyphus xylopyrus* and *Bassia latifolia* indicate a more robust habit of growth. The leaves are much broader and excessively coriaceous, and the light-brown colour to which they have dried, gives them a different aspect as compared with typical specimens from other localities in N. India. Trimen says, that in Ceylon the plant dries to a pale yellowish-brown colour. Sir Joseph Hooker was of opinion that the Banda plant might prove to be a different species. The only available material now at Kew is, however, insufficient to settle this point.

Uses:—The leaves of a viscum, doubtfully referred to this species, growing on Nux-Vomica trees in the neighbourhood of Cuttack, have been found to possess poisonous properties, similar to those of the tree on which it grows. The subject was investigated by Sir William O'Shaughnessy, who detected in the powdered leaves the presence of strychnine and brucine.

The powder of the dry leaf was used as a substitute for these drugs in the Hospital of the Medical College, Calcutta, with complete success, in doses of one to three grains thrice daily. (Bengal Disp.)

1108. *V. orientale*, Willd. H.F.B.I., v. 224 ; Roxb. 715.

Vern.:—Banda (H., Santal. and Kol.); Gurbel (Gond); Sundara badinika (Tel.).

Habitat.:—Behar, Bengal and Travancore.

A rather much-branched, leafy shrub, black or brown when dry. Branches often very slender, terete or angled and grooved, opposite and whorled; branchlets angular. Leaves rarely more than one inch, often unequal, petioled; from obovate to elliptic-oblong and linear-oblong, obtuse, 3-5-nerved, base narrowed, or rounded. Flowers minute, under $\frac{1}{10}$ in. long, rarely more than 5, in sessile or peduncled clusters, monœious. Perianth usually 3-cleft. Perianth-lobes deciduous. Fruit of the size of a pea, smooth (Kurz), "purple," copiously minutely dotted (W. and A.).

Use.—In Chutia Nagpur, this plant is largely used medicinally, and is believed to derive some particular property from the tree on which it is found. It is employed in as many different diseases as the trees on which it is found. (Campbell.)

1109. *V. articulatum*, *Burm.*, H.F.B.I., v. 226.

Vern.:—Pan, pūdū (H.); Katkom janga Santal); Hurchu (Nepal); Patha (Banda); Banda (C. P.); Harmore (Thana).

Habitat.:—Sub-tropical Himalaya, from Chamba to Sikkim, also Assam, Mishmi, Khasia mountains, southwards to Travancore.

A much-branched, leafless, green parasitic shrub, forming pendulous tufts 6 in. to 3 ft. long; greenish-yellow when dry. Main stem terete. Branches flat, longitudinally striate, and furrowed, contracted at the nodes, internodes, widening upwards, 1-2 in. long. Flowers sessile, in sessile, 3-flowered spikes; two or several spikes at a joint. Perianth of male flowers reflexed. Female flowers 2-bracteolate, the perianth-lobes erect, triangular. Fruit sub-globose, $\frac{1}{2}$ in. long, yellow when ripe, sessile, in clusters of 4-5 at the nodes, each fruit supported by a shallow cup-shaped bract. Found on *Cordia vestita*, *Cornus capitata*, *Pyrus*, *albizzia stipulate*, *Albizzia amara* (Mahableshwar, Pratapgad Road).

Uses.—In Chutia Nagpur, a preparation from the plant is given in fever attended with aching limbs. The many joints in the plant have probably influenced the Santal ojas in their

application of it. It is probably one of the many cases of the use of a remedy from a belief in the theory of signatures (Rev. A. Campbell.)

N. O. SANTALACEÆ.

1110. *Santaium, album, Linn.* H.F.B.I., v. 231; Roxb. 148.

Sans.:—Chandana, srikhanda.

Vern.:—Chandan, sufed-chandan (Hind.); Chandan (Beng.) Sandal (Dec.); Shandanak-kattai, Chandanamaren (Tam.); Gandhapu-chekka (Tel.); Chandana mutti (Mal.); Srigandhadamara, Gandhakâ-chekke (Kan.); Chandan Nasaphiyn, sandakú (Burm.).

Habitat:—Deccan Peninsula; from near Poona on the west and Midnapoor on the east, southwards, on dry hills, ascending to 3,000 ft., cultivated elsewhere.

A small, evergreen, glabrous tree. Bark dark-grey, nearly black, rough with short vertical cracks, inner bark red. Wood hard, very close-grained and oily; sapwood white, scentless; heartwood yellowish-brown, strongly scented. Branches slender, drooping. Leaves opposite, ovate or ovate-lanceolate; blade $1\frac{1}{2}$ – $2\frac{1}{2}$ in.; petiole $\frac{1}{2}$ in. Flowers brownish-purple, in axillary or terminal paniced cymes. Perianth campanulate; limb of 4 valvate triangular segments. Stamens 4, exserted, alternating with 4 rounded, obtuse scales, which may be regarded either as petals or as lobes of the disk. Drupe globose, $\frac{1}{2}$ in. diam., black; endocarp hard.

Uses:—Sandal-wood is described in Hindu medical works "as bitter, cooling, astringent and useful in biliousness, vomiting, fever, thirst and heat of the body. An emulsion of the wood is used as a cooling application to the skin in erysipelas, prurigo and sudamina." (Hindu Materia Medica.) The wood, ground up with water into a paste, is commonly applied to local inflammations, to the temples in fevers, and to skin diseases to allay heat and pruritus. It also acts as a diaphoretic. A yellow volatile oil is distilled from the wood, which has been reported

as a remedy for gonorrhœa. (*Pharm. Ind.*) It has of late been prescribed as a substitute for copaiba in modern European medicine. (*Pharmacographia*.) The author of *Makhzan-ul-Adwiya* describes the wood as cold and dry, cardiac, tonic, astringent, alexipharmic, anti-aphrodisiac, a resolvent of inflammatory swellings, &c. He recommends an emulsion in bilious fever on account of its cooling and protective influence over the heart, brain, stomach, etc. As an external application a paste made with rose-water and camphor, or with sarcocolla and white of egg, may be applied to relieve headache or to any kind of inflammatory swelling or skin affection. (Dymock.)

In cases of morbid thirst the powder of the wood is recommended to be taken in cocoanut water. A bolus of ground sandal checks hæmoptysis in its mild form, when taken twice a day for two or three days.

The seeds contain an oil which is used in skin diseases. The seeds are also eaten. (B. D. Basu.)

The wood yields an essential oil the amount of which, on the average, varies from 3 to 6 per cent. It has been observed that the wood growing on hard and rocky soil is richer in oil than those growing on comparatively fertile soil. (Puran Singh).

The constants of the oil made by mixing the products obtained in the distillations are as follows:

Specific gravity at 26°C	...	...	...	97.65
Optical rotation	...	...	...	-15.6° to -16°
Saponification number before acetylation	...	...	...	5.72
Saponification number after acetylation	...	...	...	21.13
Santalol content	...	...	...	99.4

1111. *Osyris arborea*, Wall., H.F.B.I., v. 232.

Vern.:—Bakardharra, bakarja (Kumaon); Popli (Belgaum); Jhuri (Nepal).

Habitat:—Outer Himalaya, Sub-Himalaya-Tract from the Sutlej to Bhutan. Central Provinces, West Coast from the Konkan south-ward to the top of the Ghats, also in the Hill ranges of South India, Shan Hills, Burma; Ceylon.

An evergreen shrub or tree, twiggy, as a rule glabrous. Bark dark, greyish-brown, rough, with shallow, vertical fissures. Wood red, hard, close-grained (Gamble). Branches numerous, stiff, virgate. Branchlets 3-sided, with prominent, sharp angles.

Leaves rather crowded, coriaceous, $\frac{3}{4}$ -1 $\frac{1}{2}$ in., elliptic or obovate, or lanceolate, acute at base, obtuse, but sharply apiculate, (mucronate), entire, glabrous, nearly sessile. Flowers pale-green, minute, 3 sometimes 4-merous. Solitary, sometimes 2-3 together, axillary, on long, slender peduncles. Males $\frac{1}{2}$ in. across, in axillary pedunculate, 5-10fid. clusters; perianth-lobes triangular; stamens opposite the lobes; disk fleshy, 3-lobed; the lobes alternating with stamens; bisexual. Perianth superior, obconical; Drupe yellow, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam. Seed one (Brandis), ovoid, truncate, yellowish-white, says Trimen.

Use.:—The infusion of the *Leaves* has powerful emetic qualities (Watt).

N. O. EUPHORBIACEÆ.

1112. *Euphorbia hypericifolia*, Linn., H.F.B.I., v. 249.

Syn.:—*E. parviflora*, Linn., Roxb. 394.

Vern.:—Hazârdâna (Pb.); Nâyeti Dudh mogra (Bomb.), Dhâkti-dudhi (Mar.); Ela-dâdâ-kiriya (Sing.).

Habitat:—Common throughout the hotter parts of India, from the Punjab to the Southern Deccan.

A rather slender, rarely stout annual, 3-18 in. long, glabrous or sparsely pubescent, erect or decumbent. Leaves $\frac{1}{2}$ -lin., rarely more or less, not coriaceous, more or less serrulate on all the margins except toward the base, opposite, obliquely, broadly or narrowly oblong, obtuse; nerves distinct; base rounded or cordate. Stipules minute, setaceous, lacerate or O. Involucres, very minute, turbinate, glabrous, with quite entire, minute bracts at the base of the pedicel; glands very shortly stipitate; lobes usually projecting above the glands; limb of the latter white or pale-pink, always small, but very variable in size, sometimes O. Styles, very short. Capsule sub-globose, $\frac{1}{2}$ in. in diam. Cocci more or less pubescent or glabrous. Seeds ellipsoid, 4-angled, with a thin, mucous coat, bluish when dry, very variable as to the amount and depth of the shallow depressions on the faces which are often obsolete.

Uses.—It is given with milk to children in colic (Stewart). It possesses properties similar to those of *E. pilulifera* and *E. thymifolia* (S. Arjun). Dr. W. Zollickoffer (in Am. Journ. of Med. Soc. XI. 22) recommends an infusion of the dried leaves as a remedy in dysentery, diarrhoea, menorrhagia, and leucorrhoea, and finds that it affects the system as an astringent and feeble narcotic.

1113. *E. pilulifera*, Linn., H.F.B.I., v. 250.

Syn.:—*E. hirta*, Linn. Roxb. 394.

Vern.:—Buru keru (B.); Dudhi (H.); Pusi-toa (Santal); Gordon (C. P.); Nayeti (Bomb.); Dudhi or mothidudhi (Mar.); Dudheli (Guz.); Amumpatchay-arissi (Tam.); Bidarie, nânâ-beeam, nanabâla (Tel.).

Habitat:—Throughout the hotter parts of India from the Punjab eastwards and southwards to Ceylon and Singapore.

An annual herb, erect or ascending, hispid with copious, crisped hairs. Stem and branches 1-2ft. Leaves very short, opposite, elliptic-oblong, obovate, or oblong-lanceolate, acute, toothed or serrulate, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long; base usually narrow and obliquely cordate; nerves distinct. Stipules minute, linear; petiole distinct, very short. Involucres numerous, in axillary and terminal dense-fid, sessile or peduncled cymes, minute, about $\frac{1}{2}$ in., pubescent; limb or glands very narrow or obsolete; glands small, globose. Capsule $\frac{1}{4}$ in. diam., appressedly or patently hairy. Seeds pale-brown, acutely-angled, transversely, shallowly rugulose, ovoid.

Uses.—Reported to have been successfully used in asthma and chronic bronchial affections. It is used in the forms of decoction or concentrated essence (Christy's New Plants and Drugs No. V., p. 64, 1882; No. VI., p. 93, 1882; No. VII., p. 47, 1884; No. VIII., p. 55, 1885; No. IX., p. 35, 1886). "Dr. Daruty informs me that the juice of both the *Euphorbia pilulifera* and *E. hypericifolia* is given with benefit in dysentery and colic, and that the milk is applied to destroy warts" (Christy, N. C. P., No. IX., p. 36).

The plant is chiefly used in the affections of childhood, in worms, bowel complaints and cough. Sometimes prescribed

also in gonorrhœa (S. Arjun). The root is given by the Santals to allay vomiting, and the plant to nursing mothers when the supply of milk is deficient or fails (Revd. A. Campbell). It has a reputation as a vermifuge (Dymock).

The capital symptom calling for this new remedy is paroxysmal spasmodic dyspnoea. ... Dr. Tison gives favourable reports of this medicine in dyspnoeas of cardiac origin. ... In all his patients the heart and kidneys seem to have been sound. The *Euphorbia pilulifera* has not seemed to have any action on the cough and expectoration in chronic bronchitis, nor it seemed to modify the râles of humid asthma. ... In its mode of action it acts in two ways: locally on the stomach, and, after having been absorbed, on the respiratory functions.

Conclusions.

1. The active principle of *euphorbia pilulifera* is soluble in dilute alcohol and water, insoluble or but little soluble in ether, chloroform, di-sulphide of carbon and essence of turpentine. 2. It is toxic in small doses to small animals, killing them by arrest of the respiratory movements and cardiac pulsations, which are first accelerated, then slowed. 3. Its effects are not cumulative. 4. It seems to act directly on the respiratory and cardiac centres; it leaves intact the other organs. 5. It seems to be eliminated by the liver. 6. Locally it is without action on the skin and mucous membranes, except the gastric mucous membrane, which it irritates. 7. It gives good results in attacks of dyspnoea caused by spasmodic asthma, emphysema, or chronic bronchitis. It ought to be employed in daily doses corresponding at the most to one gramme of the dried plant, and should be taken well diluted with water at meal time. (*Quart. Therap. Rev.*, Jul. 1885.)

The entire plant of *Euphorbia pilulifera* L. which had been obtained from the Fiji Island, was examined. The air dried material was extracted with alcohol, and the extract distilled with steam, when about 0.02 per cent. of an essential oil was obtained. The following substances were isolated from that portion of the alcoholic extract soluble in water: gallic acid, quercetin, and a new phenolic substance, $C_{23}H_{15}O_{15}$. The aqueous liquid also contained amorphous glucoside material and a lævo-rotatory sugar which yielded al-phenyl-glucosazone. The soft resinous material left after treating the alcoholic extract with water amounted to about 3.2 per cent. of the original air dried material. This yielded the following substances: tricieontane and apparently a little ceryl alcohol; a new monohydric alcohol, *euphosterol*, $C_{23}H_{39}OH$, m. pt. 274° – $275^{\circ}C$., giving an acetyl derivative m. pt. 295° – $297^{\circ}C$., and a bromo-acetyl derivative m. pt. 183° – $186^{\circ}C$., a phytosterol m. pt. 132° – $133^{\circ}C$; a phytosterolin; Jambulol $C_{15}H_{31}O_4$ (O. H)₅; melissic acid and a mixture of higher fatty acids. Euphosterol is evidently closely related to taraxasterol and homotaraxasterol—(Abstract from *Ph. J.* of 1913 in the *J. Ch. I.* for May 15, 1913, p. 505.)

Among the various constituents, there is none to which any specific physiological action may be ascribed. Such therapeutic virtues as the plant

has been presumed to possess would, therefore, not appear to depend upon any single substance of a definite chemical character. (Hooper.)

1114. *E. thymifolia*, *Burm.* H.F.B.I., V. 252; *Roxb.* 394.

Sans. :—Rakta vinda chada.

Vern. :—Dudiya sweta kerna (B.); Dudhi, chotka dudhi (H.); Bara dodak, hazârdâna (Pb.); Chinamam; Sittra paladi; Patcha arise (Tam.); Reddi vâri mânu bâla; Biduru nâna biyyam (Tel.); Nâyeti (Bomb.); Mathi-dudhi (Mar.).

Habitat :—Throughout India in the plains and lower hills, ascending in Kashmir to 5,500 ft.

A small, pubescent, much-branched, annual herb; stems 4-12 in. divaricately branched, spreading flat on ground, stipular, minute, serrate. Leaves opposite, oblong, $\frac{1}{4}$ in., obtuse; teeth acute or rounded. Involucres campanulate, minute, axillary; teeth 4; lobes very short; glands green, narrowly bordered with a white petiole; very short, rounded limb, sometimes absent. Styles short. Capsule pubescent with bluntly keeled lobes; seeds wrinkled.

"The whole plant has often a coppery tinge," says Trimen. It flowers all the year round. Colour pink, a common weed. Flower heads very small; sessile, 1-3 in. axil. Trimen makes the following remark, which is well worth quoting here :—"The severed end of a branch, made to touch lightly the surface of water, has the singular effect of violently repelling to considerable distance all floating particles in the neighbourhood."

Uses :—The expressed juice or powdered plant with wine is given as a remedy for the bites of venomous reptiles, and is applied externally to the bitten part; with milk it acts as a purgative and expels all noxious humors from the body. According to Ainslie, the Sanskrit name is Rakta-vindu-chhada, which would imply that it is a remedy for *Rakta-vindu*, "gonorrhœa with sanious discharge." He remarks :—"The very small leaves and seeds of this low-growing annual plant, which, in their dried state, are slightly aromatic and a little astringent, are given by the Tamool doctors, in worm cases, and in certain bowel affections of children; they are commonly administered in the form

of powder, and in buttermilk, to the quantity of one pagoda and a quarter weight in the course of the day on an empty stomach. The leaves when carefully dried smell something like tea." (*Mat. Ind.*, ii., 75.) Irvine states that it is used as a stimulant and laxative in Northern India. In the Concan the juice is used to cure ringworm, and mixed with chloride of ammonium for the cure of dandriff. O'Shaughnessy says that the juice is a violent purgative, and that the fresh plant is, by the Arabs, applied to wounds. In the *Dict. Econ. Prod. of India*, it is stated, on the authority of the Rev. A. Campbell, that the Santals use the root of this plant, which they call Nanha-pusi-toa, as a remedy for amenorrhœa. (Dymock.)

Chemical composition.—An alcoholic extract of the whole plant was mixed with water acidulated with sulphuric acid, and successively agitated with petroleum ether and ether, and then reagitated with ether from the solution rendered alkaline with sodic carbonate. The petroleum ether extract contained a large amount of colouring matter; it had a very faint bitter taste; on standing, dark, and what appeared to be crystalline, points separated, but which, on microscopic examination, were destitute of regular structure. Euphorbon was specially sought for, but we arrived at no definite conclusion relative to its presence.

The acid ether extract was of a greenish colour, and partly soluble in water, the solution giving a greenish coloration with ferric chloride, and precipitating gelatine, but giving no reaction with cyanide of potassium.

After washing off by cold alcohol the extractive adhering to the sides of the capsule, and which was insoluble in water, a sulphur-yellow deposit was left, which, on microscopic examination, consisted of very minute needles. This principle was present in only minute traces, and was soluble even in warm alcohol with difficulty; it gave the reactions of quercitrin.

The aqueous original acid solution, before the addition of sodic carbonate, was of a bright claret colour; on the addition of the alkali sage-green flocks separated, the addition of acids causing solution, and reproducing the original claret-coloured solution but, after standing, the flocks became insoluble in acids, and only a faintly yellowish-red tint was produced by their addition.

The alkaline ether extract contained an alkaloidal principle which crystallized in fine colourless feathery crystals; it possessed no bitter taste. With Frohde's reagent in the cold a very faint-yellow tint was produced, which was changed to greenish on gently warming. Concentrated nitric acid gave a yellowish tint. Sulphuric acid and potassium bichromate no colour reaction. (*Pharmacogr. Ind.* III. 251-252.)

1115. *E. microphylla*, Beyne. H.F.B.I., v. 252.

Vern.:—Chhoto-Kerne (B.); Dudhia-phul (Santal).

Habitat:—Bengal, Bundelkand and Southern India.



An annual herb, quite glabrous or sparsely hairy. Stems very many, prostrate and spreading from the root; leafy, very slender, and much distichously branched, spreading in a whorl from the root, 4-10 in. long, whitish brittle. Leaves always small, opposite, $\frac{1}{8}$ - $\frac{1}{4}$ in., very short, obliquely-oblong, rounded-oblong or sub-quadrate, coriaceous, opaque, sometimes as broad as long, spreading at right angles; if toothed, only at the broad end; nerveless. Stipules minute, triangular, 2-partite or lacinately toothed. Involucres numerous from the base to the tip of the stems and branches, minute, campanulate, very shortly pedicelled. Bracts at the base of the pedicels, subulate; lobes triangular, acute, nearly entire; glands very shortly stipitate. Style very short. Capsule shortly pedicelled, $\frac{1}{8}$ in. diam. Cocci obtusely keeled, glabrous. Seeds smooth, bluish, when wet mucous.

Use:—In Chutia Nagpur, a preparation of this plant, along with that of *Cryptolepis Buchanani* is given to nursing mothers when the supply of milk fails or is deficient (Rev. A. Campbell).

1116. *E. tirucalli*, Linn., H.F.B.I., v. 254; Roxb. 390.

Sans.:—Gandēri, trikaṇṭaka, vajradruma, daṇḍasinhā.

Vern.:—Sehnd, thohar, sehunr (H.); Lanka sij, lātadāona (B.); Siju (Sant.); Seju, ksharisiju, lanka (Uriya); Thora, Thúr (Sind.) Niwal nivali shera, seyr, teg, vajraduhu (Mar.); Thor-dandalio (Guz.); Tirukali, kalli, kombu-kalli (Tam.); Jemudu, kalli (Tel.); Kodukalli, mondugalli (Kan.); Tirukalli; kâteruma (Mal.).

Habitat:—A native of Africa, naturalized in Bengal, the Konkan and the Deccan, as also in Sindh. Thrives very well at Karachi.

A large, unarmed, milky shrub or small tree, 10-20 ft. Bark brown or greenish-brown. Wood white or grey, moderately hard. Trunk 6-10 in. diam., green, cylindric, densely branched above. Branches terete, smooth, green, jointed, slender like stout rushes, becoming as thick as the little finger. Leaves

fleshy, linear or linear-cuneate or obtuse, sessile, up to $\frac{1}{2}$ in. long, turbinate, crowded at the ends and in the forks of the branches, sub-sessile, with 2 small leaves at the base of the pedicel; lobes short, hairy; glands transversely ovate, punctate; bracteoles very numerous, lacerate. Capsules $\frac{1}{4}$ in. long, darkbrown, deeply 3-lobed, villous; cocci compressed, velvety. Seeds ovoid, smooth.

Uses:—The fresh milky juice of *E. Tirucalli* is said to be an effectual application for the removal of warts, and, incorporated with any bland oil, is used in common with the milky juice of other species as a rubefacient embrocation in rheumatism. The inspissated milky juice formerly enjoyed great repute in India as an antisymphilitic (*Ives' Voyage to India*, p. 462, and *Sonnerat Voyage*, vol. i., p. 146); and Dr. J. Shortt reports having found it an excellent alterative in these cases in doses of five grains night and morning. (Ph. Ind.)

In the Concan 1 to 4 drops of the milky juice are given with treacle or the flour of *Cicer Arietinum* as a purge, and the charcoal, which is very light, is used in making pastilles. Dr. G. Y. Hunter speaks of the juice as a good application in neuralgia. (Dymock.)

1117. *E. neriifolia*, Linn., H.F.B.I., v. 255.

Syn.:—*E. ligularia*, Roxb. 391.

Sans.:—Snuhi; Vujri; Sehunda.

Vern.:—Sehund, kutte ki jibh ki send va patta, thohar, sij (H.); Mansa sij (B.); Gangichû (Pb.); Nivadunga, minaguta, (Mar.); thohur (Sind); Ilaik-kalli (Tam.); Aku-jemudu (Tel.); Yalekalli (Kan.).

Habitat:—Deccan Peninsula; common in rocky places; cultivated in Bengal and elsewhere in native villages.

A small, erect, fleshy, glabrous tree, armed at the nodes with a pair of sharp spines, $\frac{1}{8}$ – $\frac{1}{4}$ in. long. Bark reticulated; pith large, round. Wood white, soft, even-grained. "Stems cylindric, branches round, but the nodes arranged in 5 more or less spirally twisted ribs; branchlets 5-angled. Leaves few, deciduous, 6-12 in. long, terminal on the branches, waved, narrowed

into a very short petiole, cuneate or oblanceolate, usually acute or mucronate. Involucres yellowish, in small, compact, shortly pedunculate, dichotomous cymes from the sinus between the nodes; lobes large, erect, roundish, cordate, fimbriate. Styles connate, high up, undivided; stigmas capitate. Capsule about $\frac{1}{2}$ in. broad, deeply 3-lobed. Cocci compressed, glabrous.

Uses.:—The root enjoys repute as a remedy in snake bites, but there is no reliable evidence of its utility in these cases. The expressed juice of the leaves is reported to prove very effectual in relieving the paroxysms of spasmodic asthma. (Ph. Ind.)

In Hindu medicine, the milky juice is considered purgative and rubefacient. As a purgative it is generally used in combination with other medicines which are steeped in it. Chebulic myrobalan, long pepper, *tivrit* root, etc., are thus treated and administered as drastic purgatives in ascites, anasarca and tympanites. It enters into the composition of several compound prescriptions of a drastic character (Dutt). "The juice is employed in ear-ache and, mixed with soot, in ophthalmia as an *anjan*" (T. N. Ghose, in Watt's Dic.).

Hemagglutinins (rabbit blood) were found in 26 of 47 Types of *Euphorbia* examined. The agglutinating action on different bloods (pigeon, rabbit, guinea pig, rat, sheep, goat) differed. The active substance of *Euphorbia neriifolia* is fairly resistant to boiling. When hemagglutinins are contained in the vegetative parts of the plant they can be absent from the seeds and *vice versa*. (Ch. Abs. 10th Jan. 1913 p. 104.)

1118. *E. nivulia*, Lam., H.F.B.I., v. 255.

Syn.:—*E. neriifolia*, Roxb. 392.

Vern.:—Thohar (H.); Shij (B.); Newran (Mar.); Ellaculli (Mal.); Elakullie (Tam.); Akoo-jemoodoo (Tel.)

Habitat:—N.-W. Himalaya; on dry rocky hills. Guzerat, the Deccan Peninsula and Sindh.

A large shrub or tree, 20-25ft. Branches in whorls of four, fleshy, nearly cylindric, with vertically or spirally arranged tubercles, each supporting a pair of stipular prickles. Leafless in cold and dry season. Leaves alternate, 6-12 in. long, ovate-oblong or linear; tip rounded; midrib much elevated beneath;

lateral nerves indistinct. Involucres 3 together, central sessile with male flowers, lateral, pedunculate with only male or both male and female flowers; lobes fimbriate, erect, ovate. Bracteoles many. Capsule $\frac{1}{8}$ in. diam. Seeds smooth. (Kanjilal.)

Uses:—The juice of the leaves used internally as a purgative; mixed with *nim* oil externally applied in rheumatism. On the Western Coast bark of the root boiled in rice water and *arrack* given in dropsy. Leaves, simply warmed in the fire, will promote urine, externally applied, while their juice warmed is a good remedy in ear-ache and occasionally rubbed over the eyes to remove dimness of sight. (Ainslie and Rheede.) The pulp of the stem, mixed with green ginger given to persons bitten with mad dogs, previous to the appearance of hydrophobia. (*Journ. Agri-Horti. Soc.* X 37.) Horsfield (*Asiat. Journ.*, vol. vii, p. 265) mentions a case of dropsy in which he prescribed the inspissated juice of *E. Nivulia* in doses of a few (?) grains as a diuretic, and states that it was productive of evident relief. (*Ph. Ind.*)

Chem. Comp.—The dried juice contains 35 per cent. of Euphorbon, 25.40 per cent. of resin soluble in ether, 13.70 of resin insoluble in ether, 1.50 per cent. of caoutchouc, and the other constituents of commercial gum euphorbium. The dried juice of *E. Tirucalli* was also found to be of a similar nature, and to contain 4 per cent. of caoutchouc. Henke examined the juice of sixteen species of Euphorbia and ascertained that they all contain euphorbon, so that we may fairly suppose it, as well as an acid resin, malate of calcium, and caoutchouc, to be a constant constituent of the milky juice of all the plants belonging to the genus. (*Archiv. d. Pharm.* Vol. 224, 729-759.)

1119. *E. antiquorum*, Linn., H.F.B.I., v. 255; Roxb. 390.

Sans.:—Sihunda, vajra, vajrakantaka.

Vern.:—Tindhâra sehund, tidhâra-sehnr (H.); Narasij, tekâtâsij, bâjbâran, lariya-dâona (B.); Etkec' (Sant.); Dokânâ-siju (Uriya); Shidu (Michi); Naraseja (Mar.); Tandhâri-send (Guz.); Shadhurak-kalli, tirikalli (Tam.); Bomma jemudu, bontachemudu (Tel.); mudu, mula-jemudu (Kan.); Katak-kalli (Mal.).

Habitat:—Throughout the hotter parts of India in dry places.

A polymorphous plant (Wight), attaining 25ft. (Kurz), 15-30ft. (Trimen). Trunk stout, often 3ft. or more in circum-

ference, cylindric or fluted. Bark thick, very rough and corrugated, brown. Branches numerous, curving upward, young whorled, stout, fleshy, green, jointed with 3 very wide, thick wings, which are narrowed to either end in each joint, and very coarsely repand-crenate. Leaves very small, $\frac{1}{4}$ - $\frac{1}{2}$ in., sessile on summit of each crenation, cuneate, truncate, glabrous, fleshy, almost nerveless, soon falling. Stipullary spines short, sharp divaricate, persistent; flower-heads in small, shortly stalked cymes of 3, the central, sessile, the 2 lateral on long, stout pedicels. Bracts opposite, obovate. Bracteoles abundant, fimbriate. Involucre-glands 5; very large, much broader than long, yellow, fleshy. Male flowers (stam.) numerous, mixed with many lacinate branchlets; female flowers:—ovary, nearly sessile; styles combined, for half their length; capsule 3-lobed, rather depressed; lobes ovoid, slightly compressed. Flowers greenish-yellow or pink. Usually appears leafless, as the small, fleshy leaves are quickly deciduous; contains abundance of pith in the centre; and the whole plant contains a very viscous, acrid, milky juice.

Uses:—A plaster, prepared from the roots and mixed with asafœtida, is applied externally to the stomachs of children suffering from worms. The bark of the root is purgative, and the stem is given in decoction in gout (Wight and Rheede). The juice, which flows from the branches, is used as a purgative to relieve pain in the loins. It is an acrid irritant in rheumatism and tooth-ache. When taken internally, it acts as a drastic purgative. It is also employed in nervine diseases, dropsy, palsy, deafness and amaurosis (Baden-Powell). A preparation from this plant is in Chutia Nagpur given as a cure for cough (Revd. A. Campbell).

In the Nighantas the plants are described as purgative, pungent, digestive, bitter and heavy, and are said to be useful in constipation, flatulent distention, tumours, swellings, abdominal enlargements, rheumatism, spleen, leprosy, mania and jaundice.

They abound in an acrid milky juice, which is a popular application to warts and other cutaneous affections. The native doctors purify arsenious acid by packing it in a hole made

in a piece of the stem, closing the hole and exposing the stem to the action of fire until it is charred. The milky juice of *E. neriifolia* is usually administered internally by soaking other purgatives and aromatics in it, so that by absorption of the juice their purgative properties become increased. A similar method is adopted when the juice is applied externally, a tent or issue pea being prepared with some finely powdered drug and steeped in it. Ainslie tells us that the native practitioners prescribe the juice as a purge and deobstruent, in those visceral obstructions and dropsical affections which are consequent of long-continued intermittent fever, the quantity given for a dose being about $\frac{1}{4}$ of a pagoda weight (20 grs.). Externally, mixed with margosa oil, it is applied to limbs which have become contracted from rheumatism. (*Mat. Ind.*, Vol. II., p. 97.) In Bombay the root is mixed with country liquor to make it more intoxicating, and the juice is used to kill maggots in wounds, and is dropped into the ear to cure earache, a practice common to many parts of India. In the Concan the stem is roasted in ashes, and the expressed juice, with honey and borax, given in small doses to promote the expectoration of phlegm; sometimes the juice of *Adulsa* is added. For asthma, *Mudar* flowers, *Aghada* root, and *Gokaran* root are steeped in the juice, powdered and given with honey and chebulic myrobalans. Dose about 4 grains. The author of the *Makhzan-ul-Adwiya*, under the name of Zakûm (*Euphorbia*), describes four Indian species, which are probably *E. antiquorum*, *E. neriifolia*, *E. Nivulia* and *E. Tirucalli*. The milky juice of the first, he says, is mixed with the flour of *Cicer arietinum*, roasted, and administered in pills as a remedy for gonorrhœa. It has a strong purgative action. (Dymock.)

1120. *E. royleana*, Boiss., H.F.B.I., v. 257.

Vern:—Shakar pitan, thar (Pb.); Sali, chula, shûn, chu, duro (Himalayan names); Sihund (Kumaon); Afarbioon (Sind).

Habitat:—Outer Himalaya, in dry hilly tracts from Kumaon to the Jhelum. Salt Range.

A small tree with fleshy branches. Wood soft, white, spongy. Attains, 15-16ft., and has a girth up to 6ft. Branches with 5, sometimes 7, broad, flat faces, separated by sharp undulating

angles; spines in pair at the nodes. Leaves few or wanting. Involucres $\frac{1}{2}$ in. diam., yellow or green-yellow, hemispheric, in compact sessile, 3-fid cymes, from the sinus between the nodes; styles free nearly to the base. Cocci compressed, glabrous. Capsule $\frac{3}{4}$ in. diam.

Use:—The acrid, milky juice possesses cathartic and anthelmintic properties (Watt).

1121. *E. Thompsoniana*, Boiss., H.F.B.I., v., 260.

Vern:—Hirtiz (Kashmir).

Habitat:—Western Tibet, Leh and Gilgit.

Perennial herb, quite glabrous. Stems a foot high, simple, sparingly leafy, from a stout perennial stock, unbranched, scaly at the base. Leaves $\frac{1}{2}$ – $\frac{3}{4}$ in., or even $\frac{3}{4}$ – $1\frac{1}{2}$ in. broad, coriaceous, dull yellow when dry, upper and under surface alike; sessile elliptic or ovate-obtuse or sub-acute; nerves few, obscure, ascending, floral, broader, involucral, 2 sub-orbicular. Rays 3–6, longer than the floral leaves. Involucres campanulate, glabrous, without, with 4 hairy lines within; $\frac{1}{2}$ in. broad; lobes small, fimbriate; styles long, slender; glands sub-stipitate, transversely oblong. Capsule shortly stipitate, $\frac{1}{2}$ in. long, $\frac{1}{4}$ in. diam.; cocci not separate by a deep sulcus, oblong. Seeds smooth, pale, oblong, $\frac{1}{8}$ in. long; caruncle small, peltate. A very distinct species.

Uses:—The crushed root-stocks are employed by the natives of Kuram as detergents for washing the hair, and, when boiled, are given as purgatives (Aitchison).

In Kashmir, the root-stock is employed to adulterate "*kut*" (*Saussurea Lappa*) and is called by the Kashmiris "*Hirtiz*." The stem, root and leaves are said to be used medicinally. (Aitchison).

1122. *E. helioscopia*, Linn., H.F.B.I., v. 262.

Vern:—Hiruseeah; Mahabi (H.); Gandabuti, dudai, kulfadodak, chatriwal (Pb.).

Habitat:—Throughout the Punjab plains and the Siwalik tract, ascending to 7,000 feet in the outer Himalaya. Introduced into the Nilghiri hills.

An erect annual, dichotomously branched above. Stem often very stout and copiously umbellately branched above, with divaricate branches. Leaves 2 in. long and under, membranous, alternate, shortly petioled, obovate or spathulate, serrulate; floral large, similar; involucre, orbicular or oblong, 2-4, small. Involucre $\frac{1}{10}$ in. diam., glabrous; lobes, turbinate, small, oblong; glands reniform, fimbriate. Capsule smooth, globose, $\frac{1}{8}$ in. diam.; cocci round at back. Seeds deeply reticulated, pitted, turgidly oblong or sub-globose.

Uses:—The milky juice is applied to eruptions, and the seeds are given with roasted pepper in cholera (Honnigberger). The juice is also used in the form of a liniment in neuralgia and rheumatism, and the root is employed as an anthelmintic (Murray). It is used as a hydragogue cathartic, and the juice is applied to remove warts. Dr. Bandry has reported a case of severe ulceration resulting from the application of a poultice of the bruised plant. (Dymock.)

1123. *E. dracunculoides*, Lamk., H.F.B.I., V. 262; Roxb. 390.

Vern:—Richni, sudáb (the fruit), Kangi (the plant) (Pb.); Jy-chee, Chhagul-puputi (B.); Parwa (Santal); Tilla kâda (Tel.).

Habitat:—From the Punjab to Behar in the plains and low hills, and southward to Canara and Coromandel.

An annual. Stems erect, many from the root leafy, 12-18 in. high, often extensively branched dichotomously; branches divaricate. Leaves sessile, linear-lanceolate, sub-acute, rarely rounded, or sub-cordate, 1-1 $\frac{1}{2}$ in. long, involucre, shorter 2, broader at the base. Involucres solitary, hairy within, turbinate; lobes ovate, ciliolate; glands semi-lunate; styles short, free. Capsule smooth, $\frac{1}{8}$ - $\frac{1}{4}$ in. diam., hardly depressed. Seeds oblong with a white tuberculate testa.

Use:—The fruit is officinal and used to remove warts (Watt).

The seeds yield a limpid, clear, yellowish or greenish-yellow oil, used as a drying oil and for burning. In 1843 it was pronounced in London to be as valuable as linseed oil. It is only used locally. (*Agric. Ledger*, 1911-12, No. 5.)

1124. *Buxus sempervirens*, Linn., H.F.B.I., v. 267.

Vern :—Shanda laghuue (Afg.); Chikri (Kashmir); Papri, papur, paprang, shamshád, shumaj (Pb.).

Habitat :—Temperate Himalaya, from Kumaon to Simla and Bhotan. Punjab on the Salt Range, etc.

A small, evergreen shrub or tree. Bark grey, soft, corky, cut into small plates by deep horizontal and vertical cracks. Wood yellowish-white, hard, smooth, very close and even-grained. Branchlets and young leaves pubescent. Branchlets 4-sided. Leaves opposite, coriaceous, varying from lanceolate to ovate, quite entire, 1-3 in. long, narrowed into a short petiole. Flowers yellowish, monœcious, in dense, short, axillary spikes; smell unpleasant; the terminal flowers usually female. Male flowers :—Sepals 4, biseriate, imbricate; stamens 4 free, opposite to sepals, inserted round a 4-sided rudimentary ovary. Female flowers :—Sepals 6, in two circles of 3 each; ovary 3-celled, 3-cornered; top flat; the corners terminating in thick, short styles. Capsules coriaceous, 3-valved, each valve ending in 2 horns, being the halves of 2 styles; dissepiments attached to the valves. (Brandis); seeds oblong, trigonous, with a black shining testa and fleshy albumen.

Uses :—The wood is diaphoretic; leaves bitter, purgative and diaphoretic, useful in rheumatism and syphilis. Said to be poisonous to camels. A tincture from the bark is used as a febrifuge (Stewart).

1125. *Bridelia retusa* Spreng., H.F.B.I., v. 268.

Syn. :—*B. spinosa*, Roxb. 706.

Vern. :—Pathor, mark (Pb.); Khâja, kâj, kassi, gauli (H.); Kharaka, kaka (Kol.); Kûj (Mongyr); Kadrû pala (Santal); Gaya (Dehra Dun); Gauli (Garhwal); Lamkana, augnera (Rajputana); Geio (Nepal); Pengji (Lepcha); Kashi (Garó); Kamkûi (Chittagong); Kasi, kosi (Uriya); Mulluvengay, kamanji (Tam.); Kormânu, pedda-âvem, danki-bura, dudi mâddi, kora madi, (Tel.); Kassei (Gond.); Gûnjan, kati ain, asâna (Bhil.); Phatarphod, asana, asauna (Bom.); Sun (Duk.); Asuna, goje (Kan.); Adamarathu (Tinnevely).

Habitat :—Throughout the hotter parts of India, along the foot of the Himalaya from Kashmir to Mishmi.

A deciduous tree, 50-60ft., with thorns on the back of young stems. Bark $\frac{1}{4}$ in. thick, grey or brown, rough with longitudinal cracks and exfoliating in long irregular plates. Wood moderately hard to hard, grey to olive-brown, close-grained; seasons well.

Leaves coriaceous, elliptic-oblong, ovate or obovate, acute, obtuse or rounded at the apex, the base usually rounded, bright-green and glabrous on the upper surface and turning pinkish-purple before falling, often finely tomentose beneath; main lateral nerves 15-25 pairs, straight, prominent, finely reticulate between; petioles $\frac{1}{4}$ - $\frac{1}{2}$ in. long, stipules ovate-lanceolate, unequal at the base, deciduous. Flowers diœcious, greenish-yellow, sessile or shortly pedicelled, arranged in dense axillary clusters or in long axillary or terminal paniced spikes exceeding the leaves; bracts small, obtuse, villous. Calyx $\frac{1}{8}$ in. in diam.; lobes fleshy, spreading, triangular-ovate, acute, glabrous and often tinged with red; tube pubescent. Petals of males obovate, pectinate; of the females subspathulate. Disk of male flower thick and pulpy; of the female truncate, enclosing the ovary. Drupe fleshy, subglobose, $\frac{1}{2}$ in. in diam., seated on the persistent hardly enlarged calyx, flesh-coloured or purplish-black when quite ripe. (Duthie.)

Uses :—The bark is a strong astringent and is used in Western India as a lithontriptic (Dymock). Used as a liniment with gingelly oil in rheumatism (Surg.-Major Ratton in Watt's Dictionary). Root astringent (J. J. Wood's Plants of Chutia Nagpur, p. 135).

Chemical composition.—The bark afforded 41·7 per cent. of water extract, containing 39·9 parts of tannic acid. The tannic acid gave a greyish-green precipitate with plumbic acetate, and a blue-black colour with ferric chloride. The air-dried bark left 7·35 per cent. of ash on incineration. Although this is one of the most astringent barks in India, it does not appear to be known to, or used by, Europeans in the arts.

1126. *B. montana*, Willd., H.F.B.I. V. 269, Roxb. 705.

Vern. :—Kargnalia, khaja, geia, kusi (H.); Gondni (Saharanpur); Geio (Nepal); Kaisho (Ass.); Kurgnulia (Kumaon);

Asáná (Mar. and Cutch); Asano (Bom. and Guz.); Faturfoda (Goa); Vengemaram, venge (Tam.); Gundebingula, pantangi, áuem (Tel.).

Habitat:—Along the foot-hills of the Himalaya, from the Punjab to Bhotan; Khasia Mts., Behar on Parusnath; Coromandel.

A moderate-sized, grabrous deciduous tree. Wood grey, moderately hard, nearly glabrous. Branches often pustulate. Leaves membranous, very variable, 3-5 in. long, obovate or broad elliptic, glabrous or shining above, paler beneath; lateral nerves 10-15 pair, more or less arched; cross nervules rather strong; petiole $\frac{1}{8}$ - $\frac{1}{2}$ in. long; stipules deciduous. Flowers monœious, says J.D. Hooker. But Rai Bahadur Upendranath Kanjilal says thus:—“I have seen several trees with only male, and several others with only female flowers, and so far none with both” (Forest Flora, United Provinces, Siwalik and Jaunsar divisions, p. 346, footnote, 1911, Calcutta). The flowers are small, greenish-yellow, shortly pedicelled; bracts many and crowded, membranous pubescent. Calyx $\frac{1}{8}$ - $\frac{1}{2}$ in. diam.; lobes triangular-ovate, unaltered in fruit. Ovary enclosed in disk. Styles 2, 2-fid. Petals oblanceolate. Fruit ovoid, $\frac{1}{2}$ in. long, black when ripe, seated on the unaltered calyx. The fruits are not eaten, says Kanjilal.

Uses:—Reported to possess anthelmintic properties. Much used in Bombay and Goa as an astringent medicine. (Watt.)

1127. *Cleistanthus collinus*, Benth., H.F.B.I., v. 274.

Syn.:—*Cluytia collina*, Roxb. 704.

Vern.:—Woadugu maram (Tam.); Kadishen, Korsi (Tel.); Garrar, garári (H.); Karada (Uriya); Parasu, pas, pasu, larchuter (Kol.); Kargalli (Santal); Ghara (Berar); Garari (Mar.); Kergali (Karwar); Ganari (C. P.).

Habitat:—Dry hills in various parts of India from Simla to Behar, and southward to Central India, and the Deccan Peninsula.

A small, deciduous tree. Bark $\frac{1}{4}$ in. thick, dark-brown, almost black, often with a reddish tinge, rough with numerous

cracks, exfoliating in rectangular woody scales. Wood dark, reddish-brown, tough, hard, close-grained; heartwood small. Branches spreading, rigid, twiggy, smooth or pustulate. Foliage bright-green. Leaves coriaceous, orbicular, broadly ovate or elliptic; tip rounded or retuse, glaucous beneath, $1\frac{1}{4}$ -4 by $1\frac{1}{2}$ -3 in., pale when dry, loosely reticulate, young, membranous and faintly pubescent beneath, old 4-8 pair, spreading, very slender; petiole $\frac{1}{4}$ in. Flowers yellowish-green, in small axillary, silky clusters; calyx-lobes lanceolate, or ovate-lanceolate. Calyx $\frac{1}{4}$ in. male, pulvinate, of female conical with a thick margin. Ovary quite glabrous, globose, styles free thick; stigmas fleshy, lobed. Capsule $\frac{3}{4}$ in., obscurely 3-lobed, woody sessile; rarely 4-lobed, dark-brown, shining and wrinkled when dry, top not lobed. Seeds 3, $\frac{1}{8}$ in. diam., globose chestnut-brown; albumen scanty.

Uses :—The bark or outer crust of capsule said to be exceedingly poisonous (O'Shaughnessy.)

In Chutia Nagpur the fruit and bark are employed to poison fish; the latter is also considered a useful application in cutaneous diseases. For severe headache, the head and upper part of the body are bathed in water in which the leaves have been steeped (Rev. A. Campbell.) An extract of the leaves and fruit acts as a violent gastro-intestinal irritant.

1128. *Andrachne cordifolia*, Muell., H.F.B.I., V. 283.

Vern. :—Kurkni, gurguli, kurkuli (Pb.).

Habitat :—Central and Western Temperate Himalaya, from Nepal westwards to Murree.

A small shrub with slender branches. Young shoots, petioles, and underside of leaves hairy. Wood white, moderately hard-grained. Leaves 1-2 in. long, ovate-oblong, obtuse or mucronate, pale when dry, nerves very slender. Petiole filiform, $\frac{1}{4}$ - $\frac{3}{4}$ in. Flowers $\frac{1}{8}$ in. diam., monœcious, axillary on long, filiform pedicels, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long. Calyx-segments obovate, acute, enlarged in fruit. Petioles keeled, spathulate; disk of 5 flat, bifid, membranous glands. Fruit $\frac{1}{4}$ in. diam., depressed, globose,

supported by the enlarged calyx. Seeds broadly trigonous, dorsally rounded.

Use :—The twigs and leaves are said to kill cattle when browsed in the early morning on an empty stomach. (Stewart).

1129. *Phyllanthus reticulatus*, Poir., H.F.B.I., V. 288, Roxb. 681.

Sans. :—Krishna-kamboji.

Vern. :—Panjoli, mâkhi, buin-owla, kâle-madh-kâ-per (H.) ; Panjuli (B. and Pb.) ; Kabonan (Raj.) ; Kâmohi, fruit=pika-pirû, leaves=kâmohi jopun, bark=kâmohi jochodo (Sind) ; Pâvana (Bomb.) ; Datwan (Guz.) ; Pulavayar-puttay, pillanji, karappu-pillânji (Tam.) ; Nalla-puruguddu, purugudu, nella-purudûdû, phulser (Tel.).

Habitat :—Throughout tropical India, in the plains from Sind, Behar, Rohilkund, Sikkim and Assam to Travancore.

A large straggling or climbing shrub, 8-10ft. Bark brown, thin. Wood reddish or greyish-white, hard, close-grained. Shoots glabrous or finely pubescent. Branches lenticillate, numerous, stout; woody branchlets long, drooping. Leaves 1-2in., oblong or elliptic, tip rounded, acute or obtuse; "variable," says Trimen, "lanceolate or oblong-lanceolate, nearly rotundate, glabrous or slightly pubescent, somewhat paler beneath;" nerves 6-8 pairs; slender. Petiole $\frac{1}{2}$ - $\frac{1}{4}$ in.; stipules small, subulate, persistent, hard. Flowers pink, solitary or several together on slender, axillary peduncles. Calyx-segments ovate, membranous, alternating with glands of the disk. Male flowers :—Stamens 5, filaments of the 3 inner longer, connate. Female flowers :—Ovary, 5-10-celled (Brandis), 4-5-celled (Trimen) ; styles short, minutely lobed ; stigmas short ; ovules 2 in each cell, superposed. Fruit a purple berry, sweetish when ripe, shining, smooth, depressed, globose. $\frac{1}{2}$ - $\frac{1}{4}$ in. diam., often racemose on leafless branches. Seeds 8-14, triquetrous, finely granulate, superposed in each cell, bluntly trigonous.

Uses :—The leaves are employed as a diuretic and cooling medicine in Sind. (Stocks.) The bark is considered alterative

and attenuant, and is prescribed in decoction in the quantity of four ounces or more twice daily. (Ainslie.) The juice of the leaves is used medicinally in the Konkan. It is made into a pill with camphor and cubebs, which is allowed to dissolve in the mouth as a remedy for bleeding from the gums, it is also reduced to a thin extract along with the juice of other alterative plants and made into a pill with aromatics. This pill is given twice a day, rubbed down in milk as an alterative in 'heat of the blood'. (Dymock.)

1130. *P. Emblica*, Linn., H.F.B.I., v. 289; Roxb. 684.

Sans. :—Dhâtriphala, Amritaphala, Amalakam, Shri-phalam, Sainam.

Vern. :—Aonlá, (H.) ; Ambliy (Arab.) ; Amelah (Pers.) ; Ambul, ambli (Pb.) ; Amla, àmlaki (B. and Ass.) ; Ambari (Garo) ; Neli, nellekai (Tam.) ; Shabju, zíphiyusí (Burm.) ; Anvala (Mar.).

Habitat :—Throughout Tropical India, wild or planted, from the base of the Himalaya, from Jummoo eastwards, and southwards to Ceylon.

A moderate-sized, deciduous, pretty and ornamental tree. Bark somewhat less than $\frac{1}{2}$ in., thick, light grey, exfoliating in irregular patches ; inner substance red. Wood red, hard, close-grained, warps and splits in seasoning ; no heartwood. Branchlets mostly deciduous, finely pubescent or glabrous. Foliage feathery, light green. Leaves equal and distichous, symmetrically close ; set like the leaflets of a pinnate leaf, glabrous, puberulous beneath, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, sub-sessile, linear-oblong, acute or mucronate. Stipules minute, ovate, finely acute. Flowers apetalous, monœcious, greenish-yellow, in axillary clusters. Male flowers :—Numerous and shortly pedicillate ; stamens 3, joined in a short column. Disk, of distinct glands, alternating with the calyx-segments, rarely 0. Female-flowers few, sub-sessile. Sepals as in male. Disk cupular, lacerate. Ovary 3-celled, with 2 ovules in each cell ; styles 3, connate at the base, twice bifid.

Fruit a capsule of three 2-valved cocci, $\frac{1}{2}$ - $\frac{7}{10}$ in. diam., obscurely 6-lobed, globose, fleshy, pale-yellow, dehiscent when dry, sometimes reddish when ripe, acid, astringent, and bitterish, 3-celled, 6-seeded.

Uses :—The fresh juice is cooling, refrigerant, diuretic and laxative. The exudation from the incisions on the fruit is used as an external application in inflammation of the eye. (Dutt.)

In the fresh state they are round, of the size of a gall-nut, with six valves projecting externally; pulp fleshy, acidulous, enveloping white angular seeds, and possessed of purgative properties. In the dry state they are roundish, sub-hexagonal, wrinkled, of a blackish-grey colour, slightly aromatic odour and acidulous astringent taste. In the latter state, they are employed in the process of tanning, and are highly valued as an astringent in bowel complaints. Bontius (*Diseases of India*, p. 200) testifies to their value in the treatment of diarrhœa and dysentery, in the hospitals of Batavia in his day. Antiscorbutic virtues have also been attributed to them by Dr. D. McNab (*Calcutta Med. Phys. Trans.*, vol. viii., and *Calcutta Quart. Med. Journ.* 1837, vol. i., p. 306); but Dr. Irvine (*Med. Topog. of Ajmeer*, p. 118) is of opinion that they do not possess any peculiar virtue in this respect, and that they are not superior to any other acid vegetable astringent. He mentions that they contain a large proportion of *gallic acid*. The flowers of this tree are employed by the Hindu doctors for their supposed refrigerant and *aperient qualities* (Ainslie, *Mat. Ind.*, vol. ii., p. 244). The bark partakes of the astringency of the ripe fruit. Dr. Æ. Ross reports having prepared from the root, by decoction and evaporation, an astringent extract equal to catechu, both for medicinal purposes and in the arts; he adds that chips of the wood or small branches thrown into impure or muddy water, clear it effectually; hence the wood is much employed by the natives in making well rings. This point is worthy of further inquiry. (Ph. Ind.) In the Concan, the juice of the fresh bark, with honey and turmeric, is given in gonorrhœa. (Dymock.)

The leaves are, in Baroda, used as an infusion with fennugreek seeds in cases of chronic dysentery, and are also considered a bitter tonic. In the same locality the milky juice is considered a good application to offensive sores.

Chemical composition.—The pulpy portion of the fruit dried at 100°C., and freed from the nuts, had the following composition :—

Ether extract (gallie acid, &c.)	...	...	11.32
Alcoholic extract (tannin, sugar, &c.)	...	...	36.10
Aqueous extract (gum, &c.)	...	...	13.75
Soda extract (albumen, &c.)	...	...	13.08
Crude cellulose	...	...	17.80
Mineral matter	...	...	4.12
Moisture and loss	...	...	3.83
			100.00

The acidity of the fruit was found to be equal to 9.6 per cent., calculated as acetic acid. The amount of tannic acid, estimated with acetate of lead solution, was 35 per cent. and 10 per cent. of glucose was estimated by means of Fehling's solution on an infusion of the pulp after the removal of the tannin.

Löwe considers this tannin to be identical with the ellago-tannic acid of Divi-divi. (Pharmacogr. Ind. III 263.)

1131. *P. madraspatensis*, Linn., H.F.B.I., V. 292; Roxb. 678.

Vern. :—Nala userekee (Tel.) ; Kánocha, hazarmani (H.).

Habitat :—Drier parts of India ; from Banda, throughout the Deccan Peninsula to Ceylon.

An annual herb, but sometimes very woody at base. Stem 1-3ft. erect, with long, slender, ascending, glabrous branches. Leaves on very short petioles, small, $\frac{1}{4}$ - $\frac{1}{2}$ in., cuneate-obovate, much tapering to narrower base, rounded truncate, but often apiculate at apex, glaucous and with lateral veins, conspicuous beneath. Stipules linear-lanceolate, very acute. Flowers on very short pedicels, male in small clusters, female solitary ; sepals 6, obovate-rotundate, obtuse. Male flowers :—Stamens 3, filaments connate. Female flowers :—Styles 3, very small. Fruit dry, very small, under $\frac{1}{4}$ in., depressed, 3-lobed, glabrous. Seeds very finely muricate in lines. Disk of glands in both sexes. Anthers almost sessile on the column, erect, apiculate.

Use.—The leaves are used in infusion by the *Vaidyas* in Southern India as a remedy for headache. (Ainslie.)

When soaked in water the seeds immediately become thickly coated with a semi-opaque mucilage; the kernel is oily and has a sweet nutty taste; the seeds are used medicinally on account of the mucilage which they afford. (Pharmacogr. Ind. III, 265.)

1132. *P. urinaria*, Linn., H.F.B.I., v. 293. Roxb. 680.

Sans..—Tāmra-Valli.

Vern..—Hazar mune (B. and H.); Yerra userekee (Tel.); Lal-bhuin-ānvalah (H.); Badar-zhapni (Santal); Shirappunelli (Tam.); Chiru-kizhukānelli, chukanna-kizhānelli (Mal.).

Habitat.—Throughout India, from the Punjab to Assam and Ceylon.

An annual low or tall, diffusely branched, erect or decumbent herb (becoming perennial in some soils), slender, glabrous. Leaf-bearing branchlets short, flattened or shortly winged, often tinged with red. Leaves numerous, closely placed, distichously imbricate, nearly sessile, small $\frac{1}{2}$ – $\frac{1}{4}$ in., oblong, rounded at base, apiculate, paler or silvery beneath. Stipules peltate, very acute. Flowers yellowish, all the year round, numerous, very minute, nearly sessile, solitary. Sepals green, ciliolate, those of the male's sub-orbicular; of the females oblong, not enlarged in fruit. Fruit very small, scarcely $\frac{1}{8}$ in., depressed globose, scarcely lobed, muriculate or echinate. Seeds transversely furrowed. Styles with hooked arms. Filaments very shortly united. Anthers erect, didymous, not apiculate.

Use.—Medicinal properties similar to those of *P. Niruri*.

In Chutia Nagpur, the root is believed to be sudorific, being given to sleepless children along with *Zornia diphylla*. (Campbell.)

1133. *P. simplex*, Retz., H.F.B.I., v. 295; Roxb. 678.

Vern..—Tandi meral (Santal); Bhuiāvali (Mar.); Uchehi usirika (Tel.).

Habitat:—Throughout India, in the plains and low hills, from Kumaon to Assam and southward to Travancore.

A perennial herb, often woody below, with a long tap-root and numerous, elongated, slender, prostrate or ascending, slightly-branched, compressed, glabrous stems. Leaves numerous, small, $\frac{1}{4}$ - $\frac{1}{2}$ in., on very short petioles, closely placed and often overlapping, linear-oblong, obtuse, apiculate; stipules peltate, sagittate, brown, scarious. Flowers normally solitary on slender solitary pedicels; females larger; sepals oblong, obtuse; stamens 3, distinct; styles short, bifid. Fruit very small, under $\frac{1}{8}$ in., on somewhat enlarged sepals, globose, faintly 3-lobed, usually tubercled. (Trimen). Seeds minute, trigonous, rounded on the back, finely tubercled, dark-brown.

Var.:—*Oblongifolia*.—Stem erect, diffusely branched. Leaves $\frac{1}{2}$ - $\frac{3}{4}$ in. long, elliptic-oblong, sub-acute; female pedicels $\frac{1}{2}$ - $\frac{3}{4}$ in. Dekkan Peninsula and Ceylon. (J. D. Hooker.) A very variable plant in habit.

Uses:—The natives use the fresh leaves, flowers and fruit, with cumin seeds and sugar, of each equal parts made into an electuary, for the cure of gonorrhœa, a teaspoonful is given twice a day. The fresh leaves, bruised and mixed with butter milk, make a wash to cure the itch in children. (Roxburgh).

The root is used in Chutia Nagpur as an external application for mammary abscess. (Campbell.)

1134. *P. Niruri*, Linn., H.F.B.I., v. 298; Roxb. 680.

Sans.:—Bhudhâtri, Bahupatri, Amrita-Amlika, Shina.

Vern.:—Bhûin-anvalah (Hind. and Dec.); Kizhkây-nelli (Tam.); Néla-usirika (Tel.); Kizhâ-nelli (Mal.); Kiranelli-gidâ (Kan.); Miziphiyu (Burm.); Bhui âvali (Bom.); Bhuiaola (Uriya); Niruri (Sind).

Habitat:—Throughout the hotter parts of India; from the Punjab to Assam; and southward to Travancore. A reddish petioled variety found wild and common in the Thana district. (K. R. K.)

An annual weedy herb, 6-18 in. high, branched from the base, with an erect stem, naked below, and slender leafy, angular branches above, glabrous. Leaves numerous, crowded, distichous, somewhat imbricated, spreading, nearly sessile, $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong-oval, obtuse thin, pale beneath. Stipules very acute. Male flowers:—sepals $\frac{1}{10}$ in. long, rounded; stamens 3. Female flowers:—sepals oval, sub-acute, with broad, white margins. Fruit very small, $\frac{1}{8}$ - $\frac{1}{4}$ in., depressed globose, faintly 3-lobed, quite smooth. Seeds with slender ribs. Flowers all the year, yellow (Trimen).

Uses:—The young shoots in infusion are given in dysentery. The leaves are stomachic. (Watt.) The juice of the stems mixed with oil employed in ophthalmia. Leaves and root pulverised and made into poultice with rice-water said to lessen œdematous swellings and ulcers. (Drury.) “The Rev. Dr. John informs me that he has known the fresh root prove an excellent remedy for the jaundice. About half an ounce, while fresh, was given, rubbed up in a cup of milk night and morning, the cure was completed in a few days without any sensible operation of the medicine.” (Roxb.)

“*Phyllanthus Niruri*, Linn., and *P. urinaria*, Linn., two plants indigenous throughout India, are held in considerable repute by the natives as *diuretics*, and as such are much employed in *dropsical* affections, also in *gonorrhœa*, and other *genito-urinary affections*. They have been mentioned favourably by Horsfield and others, but they do not appear to possess any special claims to notice.

“The decoction of the root and leaves is very bitter and is a favourite remedy among the natives of Porto Rico, for the cure of intermittent fevers. I have myself many times proved its efficacy in preventing the expected paroxysm. I was accustomed to employ a tincture made by myself with the whole plant, the dose being two drachms in the morning. Sometimes I repeated the dose, which acted upon the bowels as a slight purgative and this is very useful in inveterate intermittents with infarcts of the spleen and liver. The infusion of the root and leaves is a good tonic, and a diuretic when taken cold in repeat-

ed doses." (Dr. A. J. Amadeo, in *Pharmaceut. Jour.* Ap. 28. 1888.)

According to Muhammadan writers, the milky juice is a good application to offensive sores; a poultice of the leaves with salt cures scabby affections, and without salt may be applied to bruises, etc. In the Konkan, the root rubbed down with rice water is given as a remedy for menorrhagia. (Dymock.)

Regarding the chemical composition of this and of *P. urinaria*, Linn., the authors of the *Pharmacographia Indica* write:—

Chemical composition.—The alcoholic extract from the whole plant was mixed with water acidulated with sulphuric acid, and agitated first with petroleum ether, then with ether, and finally rendered alkaline and re-agitated with ether.

The petroleum ether extract was dark-coloured, and soft, with a tea-like odour, and extremely and persistently bitter. It was mixed with 3 per cent. caustic soda solution and re-agitated with petroleum ether, which removed the bitter principle contaminated with traces of oil and colouring matter. This extract gave the euphorbon colour reaction when treated with sulphuric and nitric acids. For the bitter neutral principle, we propose the name of pseudochiratin.

The acid ether extract contained green colouring matter, and was partly soluble in water with acid re-action, the solution giving a dirty bluish-green coloration with ferric chloride, slightly precipitating gelatine, but affording no re-action with cyanide of potassium.

The alkaline ether extract contained an alkaloidal principle, which, after purification, was obtained in white feathery crystals without any special taste. With Fröhde's re-agent it gave a light yellowish-red coloration, changing to blue on heating; with concentrated nitric acid, yellowish. No re-action with dichromate of potassium and sulphuric acid.

1135. *P. distichus*, Muell. Arg., H.F.B.I., V. 304.

Syn. :—*P. longifolius*, Jacq. Roxb. 684.

Sans. :—Lavani.

Vern. :—Harfarauri, chalmeri (H.); Noari, loda, fruit—hariphûl (B.); Narkulî (Uriya); Cherambola (Goa); Arunelli (Tam.); Râcha usirike (Tel.); Kirnelli (Kan.); Nelli (Malay).

Habitat :—In gardens throughout India.

A deciduous tree. Bark, says Gamble, grey; smooth, very rough, says J. D. Hooker. Wood light-brown, moderately hard, 20-30ft., quite glabrous; with very robust branches and slender leafy branchlets, 1-2ft., terete below, angular above, mostly

deciduous. Leaves rather membranous, pinnately distichous, 2-3 in., petioled, obliquely ovate, acute, pale beneath; base usually rounded. Nerves 5-8 pair, arched. Petiole $\frac{1}{2}$ - $\frac{1}{3}$ in.; stipules toothed. Flowers brownish-red, minute, most densely clustered, $\frac{1}{16}$ in. diam.; clusters axillary or in slender racemes from the thick, old branches, shortly pedicelled; occasionally 2-sexual, sometimes 3-4-merous; pedicels capillary, $\frac{1}{4}$ - $\frac{1}{2}$ in. Sepals 4, orbicular; filaments free. Disk of male, of large glands; of female, annular crenate. Stamens 4, recurved; anthers shortly oblong, slits lateral. Ovary ovoid; styles 3-4, reflexed from the contracted top, 2-partite; arms subulate, acute. Fruit globose, often crowded. Pericarp fleshy, acid, seed-lobed, generally 6-8 grooved. Endocarp 3-4-celled; parts 1-celled, 1-seeded.

Use:—The fruit is acid and astringent, the root is an active purgative, and the seed is also cathartic.

1136. *Flueggia microcarpa*, Blume., H.F.B.I., v. 328.

Syn.:—*Phyllanthus leucopyrus* Koen., Roxb., 679.

Vern.:—Parpo (Goa). Páudharphali, kánte puwan (Bomb). Dalme (H.); Rithoul (Dehra Dun).

Habitat:—The Punjab Plains. Deccan Peninsula, from Canara southwards.

A small, deciduous tree or large shrub. Bark smooth, thin, rusty or reddish-brown. Wood red, hard, close-grained. "A graceful little tree of slow growth," says Gamble. Glabrous, unarmed; branchlets slender, angled and compressed, marked with small, white specks. Branches straight and regularly fluted or angular. Leaves very variable, 1-4 in. long, elliptic-ovate, obovate or orbicular, membranous, but tough, rather glaucous beneath; tip rounded, obtuse or acute, rarely acuminate or retuse; lateral nerves 6-8 pair, very slender; petiole $\frac{1}{10}$ - $\frac{1}{8}$ in., slender. Flowers diceious, very small, pedicelled, usually in axillary fascicles. Sepals 5, imbricate. Male flowers:—Stamens 5, alternating with disk-glands, but opposite to the sepals; pastil-lode large, 3-fid. Female flowers:—Ovary, ovoid, on an annular disk; styles 3, 2-fid. Fruit of two sizes, mostly small and dry,

about $\frac{1}{10}$ to $\frac{1}{8}$ in. diam., with a few larger ones, $\frac{1}{8}$ in. diam. which are white and fleshy ; seeds 3-6, punctate (Kanjilal).

Use :—The juice of the leaves, or the leaves made into a paste with tobacco, are used to destroy worms in sores. (Dymock.)

Chemical composition.—The bark contains 10 per cent. of a tannic acid, giving a violet-black colour with ferric chloride, and the mixture becomes red on the addition of ammonia. An alkaloid is also present, giving a purplish-red colour, afterwards turning to green, with Fröhde's re-agent, and a violet colour with strong sulphuric acid and permanganate of potassium. The alkaloid is soluble in excess of alkalis. The infusion was somewhat frothy, but no sapogenin could be isolated from it after boiling with acid.

1137. *Breynia rhamnoides*, Muell., Arg. H.F.B.I., v. 330.

Syn. :—Phyllanthus rhamnoides, Willd.

Sans. :—Aruni.

Vern. :—Sarasaruni (H.), Tikkar (Oudh.)

Habitat :—Throughout tropical India, from Oudh eastwards to Upper Assam and southwards to Travancore.

A small tree or bush, quite glabrous, with many long horizontal, bifarious, flexuous branches. Bark yellowish-grey or greyish-brown, rough. Wood reddish, hard, close-grained. Twigs angular, glabrous. Leaves numerous, membranous, distichous, spreading on short petioles, 1-1 $\frac{1}{2}$ in., oval, acute at both ends, entire, glabrous, thin, pale beneath ; veins inconspicuous. Stipules minute, subulate. Flowers yellow, very small, on slender, filiform pedicels. Male flowers very small in clusters ; female solitary. Male flowers :—Calyx turbinate ; segments short, obtuse, inflexed, nearly closing to mouth. Staminal column short. Female flowers :—Calyx cup-shaped, segments acute. Ovary much-exserted, oblong, truncate. Styles very short. Fruit small, globose, $\frac{1}{8}$ in., seated on the scarcely enlarged calyx, smooth, dull-red. Seeds $\frac{1}{8}$ in., aril 0 ; testa imperforate except at the very base.

Uses :—According to Ainslie, it was brought to Dr. F. Hamilton while in Behar as a medicine of some note ; the dried leaves are smoked like tobacco, in cases in which the

uvula and tonsils are swelled. The bark is astringent. Further information upon the medicinal properties of this plant is wanted. (Dymock.)

1138. *Putranjiva Roxburghii*, Wall., H.F.B.I., V. 336.

Syn.:—*Nageia Putranjiva*, Roxb. 716.

Sans.:—Putra-jiva.

Vern.:—Jiaputa, jota, pútr-jiva, (H.); Putranjiva, jiáputa (B.); Pitoj (Sant.); Patájan, jiyaputra, seeds=jíapota; leaves=pútrajivak (Pb.); Puta-jan, putra-jiva, jiv-putrak, jiwan-putr (Mar.); Karupali (Tam.); Kadrajuvi, kudrajinie, maháputra jívi yárala, kuduru juvir (Tel.); Pongalam (Mal).

Habitat:—Wild and cultivated throughout Tropical India, from the Lower Himalaya in Kumaon, eastwards and southwards to Pegu and Ceylon.

A handsome, evergreen, moderate-sized, tree generally with pendant branches. Branchlets slender, minutely pubescent; petioles pubescent; foliage dark-green. Bark dark-grey, whitish when young, with numerous horizontal oblong lenticels. Wood grey, moderately hard, close-grained. Leaves obliquely obovate or ovate lanceolate, serrulate, 2-3 in., obtuse, acute or acuminate, coriaceous, shining, base unequal-sided. Main lateral nerves 8-10 pair, besides secondary nerves and reticulate veins. Petiole $\frac{1}{2}$ - $\frac{3}{10}$ in. long; stipules subulate, deciduous. Disk O. Male flowers short, pedicelled, in axillary clusters which are often spicate; calyx 3-5 partite; stamens 3; filaments free or connate at the base. Female flowers long, pedicelled, axillary, solitary or in twos or threes; calyx 5-6-cleft, segments small, imbricate; stamens 3, filaments more or less connate. Ovary tomentose; styles 3; stigmas crescent-shaped, fleshy. Fruit drupe, $\frac{1}{2}$ in. long, ovoid or globose; white tomentose on pedicels, $\frac{1}{2}$ in. long. Putamen hard, pointed, rugose; seed one.

Uses:—The leaves and stones of the fruit are given in decoction in colds and fevers. (Stewart.)

The nuts are hung round the necks of children to keep them in good health. They are mentioned in the Nighantas as being

also Garbha-kara, "productive of impregnation," and medicinal properties are attributed to them. The hard wrinkled nuts are generally worn only as a charm, but are sometimes given internally in colds on account of their supposed heating properties, (Pharmacogr. Ind. III. 271.

The seeds yield a rather turbid oil of an olive-brown colour, which on standing deposits the more solid portion. It is used for burning. In 1905 the seeds were tested in the Indian Museum and found to give 28·86 per cent. of kernels and the kernels yielded to ether 42·9 per cent. of a clear light-yellow oil.—(Hooper.)

1139. *Antidesma Bunias*, Spreng., H.F.B.I., V. 358.

Syn. :—*Stilago Bunias*, Linn, Roxb. 713.

Vern. :—Ariya poriyam (Mal.) ; Âmati (M.).

Habitat :—Throughout the hotter parts of India, from the Nepal and Sikkim Terai and Assam southward to Singapur and Ceylon. (J. D. Hooker.) Western Ghats from the Konkan forward. (Gamble.)

A small, evergreen tree. Bark greyish-brown. Wood red, hard ; young parts pubescent. Leaves very variable, rather large, 4-6in. by 1½-2½in., lanceolate or obovate-lanceolate, tapering at base, slightly acuminate, apiculate, glabrous, shining. Petiole short, stout ; stipule acicular, hairy, quickly deciduous. Flowers numerous, lax, reddish ; spikes solitary, 1-3in. stalked, terminating branchlets. Male flowers sometimes branched at base, sessile ; female flowers slightly stalked. Male calyx tomentose ; segments 3, shallow, rounded ; disk lobed, glabrous ; stamens 3, exserted ; pistillode, short, truncate. Female flower :—Ovary glabrous ; stigmas 3, large, short, dilated, spreading. Fruit ½in., globose, ovoid, stalked, smooth, very juicy, black when ripe, previously red. The fruit is acidulous and pleasant to taste. (Trimen.)

Uses :—The acid leaves are used in snake-bites, and, when young, are boiled and used in syphilitic cachexia. (Lindley.)

1140. *A. Alexiteria*, Linn., H.F.B.I., V. 359.

Vern. :—Noli-tali-marum (Tam.).

Habitat :—Southern Deccan Peninsula.

A much-branched, small tree. Young shoots glabrous. Wood hard, usually red, smooth, apt to split and warp. Leaves glabrous above, 1-3in., sub-sessile, from oblong or lanceolate to orbicular-ovate or-ovate obtuse, acute or acuminate, brown when dry, reticulate and shining on both surfaces, coriaceous; nerves usually very slender and obscure; petiole very rarely, $\frac{1}{2}$ in. Spikes simple or paniced, slender, pubescent, 1-1 $\frac{1}{2}$ in.; calyx 4-lobed, very minute. Disk glabrous; stamens 3. Female flowers shortly pedicelled. Stigmas very short, sub-lateral. Fruit $\frac{1}{4}$ in. diam., gibbously orbicular, turgid.

Use.—The leaves in decoction are used for snake-bites. (Balfour.)

1141. *Jatropha glandulifera*, Roxb., H.F.B.J., v. 382; Roxb. 689.

Sans. :—Nikumba.

Vern. :—Addalay (Tam.); Dundigapu; Nela-amida (Tel.); Lál-bherenda (B.); Verendi (Kol.); Undar-bibi, jangli-erandi (H.); Totla-gida (Kan.).

Habitat :—Deccan Peninsula, from the Concan southwards.

N.B.—The legend concerning the first springing up of the plant at Pandarpur mentioned by Dymock (*Pharmacogr. Ind.* III. 272) and Cooke (*Flora of Bomb.* II. 597) is not true (K. R. K.).

A shrub or small, glaucous-looking, evergreen tree, with much clear yellowish juice; trunk short, stout, dichotomously-branched, glabrous. Leaves 3-4in. long, and as broad, deeply 3-5-lobed; lobes obovate or elliptic acuminate, or acute at the apex, leafy, cordate at the base, sharply serrate with glandular bristles at the serrature tips; lateral nerves numerous, slender; petioles 2-3in. long, not glandular, nor hairy. (K. R. K.). Stipules divided into capillary gland, tipped; segments bracts setose and glandular. Flowers greenish yellow, (Hooker, but Dymock says "dull red"), glandular, in long peduncled corymbose cymes. Male flowers greenish-yellow. Calyx $\frac{1}{4}$ in. long, glabrous, very deeply divided; lobes ovate, obtuse. Corolla 5-lobed, lobes obtuse, $\frac{1}{4}$ in.; tube very short. Stamens 8, connate at the base into a column, free above. Disk of 5 glands

at the base of a staminal column. Female flowers:—Calyx divided to the base or nearly so; segments 5, ovate, acute. Ovary glabrous. Fruit smooth, ellipsoid; capsule $\frac{1}{2}$ in. diam., slightly 3-lobed; seeds ellipsoid oblong, smooth, shining, black. (Talbot, Brandis and Gamble.)

Uses:—The seeds yield by expression a fixed oil, held in much esteem by the Hindus as a stimulant application in rheumatism and paralysis. (Ainslie quoted in Ph. Ind.)

The oil possesses purgative properties. It is also used as an application to sinuses, ulcers, foul wounds and ringworm. The root brayed with water is given to children suffering from abdominal enlargements. It purges, and is said to reduce glandular swellings. The juice of the plant is used to remove films from the eyes. (Dymock.)

On extraction with ether the seeds yielded 21·3 per cent. of a light straw-coloured oil which was turbid at 55° F. The seeds form 29·8 per cent. of the capsules. Like other oils of this family it is employed as a purgative and is considered a remedy for ulcers and ringworm.

The following characters were found.—Fat: Acid value, 15·79; saponification value, 194·5; Reichert-Meissl value, 4; unsaponifiable, 1·38; butyro-refractometer at 25°, 76·5°. Fatty acids: per cent. 89·01; melting point, 35°; iodine value, 119·6; neutralisation value, 187·3; mean molecular weight 299·4. (A. K. Menon.)

1142. *J. nana*, Dalz., and Gibs., H.F.B.I., v. 382.

Vern.:—Kirkundi (Mar.).

Habitat:—The Concan; stony places near Poona and Bombay, etc.

A dwarf, glabrous, sparingly-branched shrub, 1-2ft., no glandular bristles. Leaves broadly cuneate at base, entire or 3-lobed; entire lobes broad, acute, 3-5in. diam. Petiole very short, stout, $\frac{1}{8}$ - $\frac{1}{2}$ in.; stipules not seen. Flowers glabrous, sepals entire. Styles slender, stigmas capillate.

Use:—The juice is employed as a counter-irritant in ophthalmia. (Dymock.)

1143. *J. multifida*, Linn., H.F.B.I., v. 383.

Habitat:—Native of South America, cultivated and naturalized in various parts of India.

A glabrous tree-like shrub. Bark light-brown, shining. Leaves orbicular, palmately cut into numerous narrow, entire or sub-divided, caudate, acuminate segments, 3-9 in. diam., glaucous beneath. Petiole about as long as the blade. Stipules capillary, multifid, eglandular; bracts and entire sepals glabrous. Cymes long, peduncled. Flowers and peduncle, scarlet; petals free; anthers linear. Disk of female flower areolate. Observe the presence of the corolla in this plant unusual in the Euphorbiacæ.

Uses :—The seeds are regarded as a powerful purgative. Dr. Waring once saw a case of poisoning from three of these nuts. Violent vomiting and purging, intense pain and heat in the stomach, with great prostration of the vital powers, were the principal symptoms. The patient recovered under the use of lime juice, diluted with water, and stimulants. (Ph. Ind.)

1144. *J. curcas*, Linn., H.F.B.I., v. 383; Roxb. 689.

Vern. :—Bagberenda, safedind (H. and B.); Kadam (Nepal); Kaat-amunak (Tam.); Nepalam (Tel.); Thinbankyeksu (Burm.); Mogali-eranda (M.); Yerand, Jepal (Bomb).

Habitat :—Common near villages, cultivated and naturalized throughout India.

An everegreen shrub. Trunk short, irregular. Young shoots and cymes glandular, tomentose, with an opaque, saponaceous juice; bark grey or light-brown, smooth, shining, peeling off in thin papery flakes. Wood white, or greyish-white, spongy, soft, corky in texture, loaded with starch. Pith well-marked and dense in young and topmost branches. Leaves angular or 3-5-lobed or broadly cordate, 4-6 by 3-5 in. Lobes acute or obtuse, quite entire. Petiole 5-9 in. long. Flowers yellow or yellowish-green, monœcious in terminal or sub-terminal corymbose cymes. The central flower in the cyme or in its fork is always female. Bracts small, entire, one below each sub-division of the cyme, and generally one pressing on the calyx. Sepals 5 imbricate, slightly puberulous, lanceolate, greenish. Corolla tubular, villous within; limb 5-lobed. Stamens 10 in 2 series. (Kanjilal.)

Filaments of the inner series connate. Anthers yellow, brownish-black when dry. Seeds oblong, large, black, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, $\frac{3}{8}$ in. broad, smooth. Albumen oily.

It is a hardy plant, which has taken quite kindly to the soil of Western India whether it be in the Konkan or in the Dekkan. In both these divisions of Western India, I have seen it grow profusely as a hedgeplant, where no human hand has watered it. It evidently takes its nourishment from the air, and from the soil in which it grows, depending mainly on the rain-water and dew, whenever it can get it. In the Konkan it gets its water-supply from the monsoon rains from June to October. Hooker says that the plant is ever-green. It is not so in the Konkan. I have seen that in the Thana and Ratnagiri districts it is leafless, though in inflorescence during April and May. Nay in 1898 in Satara (Dekkan) I found the plant leafless in January and February. The plant is a native of Brazil and of the West Indies." (K. R. K.)

Uses:—The seeds yield an oil which is used as a purgative and emetic medicine, and also as an application in cutaneous diseases. (Gamble.) In overdoses the seeds act as an acro-narcotic poison. The diluted oil forms a useful embrocation in chronic rheumatism. The leaves are extensively used in the Cape de Verd Islands, in the form of decoction and cataplasm to the mammæ, as a lactagogue. (*Pharm. Ind.*)

The root-bark is applied externally for rheumatism in Goa, and the same part of the plant, mixed with assafoetida and butter-milk, is, in the Konkan, prescribed in cases of dyspepsia and diarrhœa. (Dymock.)

According to Dr. Evers the juice is useful as hæmostatic. (I. M. G., 1875, p. 66.)

It may be noted here that like the leaves of the Castor-oil plant (*Ricinus communis*, Linn.) the leaves of *Jatropha curcas* have galactagogue properties. A decoction of the leaves is used in the Cape de Verd Islands to excite secretion of milk in women (A. A. B. in Maunder's Treasury of Botany, Part I, page 363, Edition 1870). Dr. Bennett of Sydney (Australia) is credited with having made the following observation in his work entitled *The Gatherings of a Naturalist*:—

"The milky acrid glutinous juice, when dropped on white linen, produces an indelible stain, at first of a light-blue colour, but after being washed changes to a permanent brown: it might, therefore, form a very excellent marking ink." I have not been able to obtain such a stain. Will any of my readers help me in settling this point? (K. R. K.) The oil of *Jatropha curcas* seeds is said to be of a light colour, and used as a substitute for Linseed oil, as well as for dressing cloth (Maunder's Treasury of Botany.) It is also said to form a basis for the red dye of the cotton fabric known as *Turkey red*.

The juice has been very successfully used by me in the treatment of scabies, eczema and ringworm. (B. D. B.)

Oil was separated from seeds by treatment with alcohol into a non-poisonous insoluble and a poisonous soluble part. The toxic constituent, *curauolic acid*, was isolated from the soluble portion by stirring with a hot saturated solution of baryta, washing the resulting paste with cold water, drying, extracting with ether, evaporating the ether solution, extracting the residue with absolute alcohol, and treating the alcoholic solution with sulphuric acid. It set to a jelly at about 10°C.

Curcin, the toxic principle isolated from fat-free curcas seeds by extraction with physiological Sodium chloride solution, was very sensitive to acid, and had a retarding influence on the coagulation of blood. (J. S. Ch. I. for 30-6-1914, p. 651).

The seeds yield about 34 per cent. of oil and the kernels about 52 per cent. The oil is yellow when fresh, becoming reddish on exposure to the air; it has an unpleasant odour, and strong purgative properties, more pronounced than those of castor oil. Curcas oil yields about 10 per cent. of solid fatty acids melting at 57.5°; the liquid fatty acids consist of about equal proportions of oleic and linolic acids. The specific gravity is 0.919 to 0.921; saponification value, 193.2; iodine value, 98.3 to 104.9; Reichert-Meissl value, 0.55; Maumené test, 65 to 68°. The fatty acids (95.5 per cent.) melt at 24-26°; iodine value, 105. (Agricultural Ledger, 1911-12, No. 5. p. 163.)

1145. *Aleurites moluccana*, Willd., H.F.B.I., V. 384.

Syn.:—*A. triloba*, Roxb. 670.

Sans:—Aksota.

Vern.:—Akrót, Akola, Jangli-akrót, (H. and B.); Khasife hindé, Jouzebarri, (Ar.); Girdagáne hindí, Chahár maghze hindí, (Pers.); Jangli, Eranda, Jelapa, Jangli ákhróta Jáphala, Akhod (Mar.); Akhoda, (Guj.); Akrota, (Cutch); Náttu akrótu kottai, (Tam.); Náttu-akrótu-vittu (Tel.); Nát-akródu (Kan.); Vadam (Mal.); Kakkuna (Singh.); To-sikya-si (Burm.); Kanyin, Mak yau lik, Mak man yau (Shan) Buah keras, Kanieri (Malay). The names given in most parts of India to this tree are those which more properly belong to the Walnut, the akrót. It is, therefore, advisable to add the word "wild," e.g., Jangaliakrot.

Habitat:—Occurs in various parts of India, especially the Malayan Peninsula. Wild in the Wynaad.

A large, evergreen tree, 40-60 ft., indigenous probably in the Malay Archipelago, cultivated in most tropical and subtropical countries, and here and there naturalized. Shoots, young leaves

and inflorescence densely clothed with brownish or grey stellate tomentum. Leaves ovate to ovate-triangular, often lobed, 4-12in. Petiole 2-5in. Flowers monœcious, white in large cymose, terminal panicles. Calyx velvety, bursting into 2 valvate lobes. Petals 5, $\frac{1}{4}$ in. long. Male flowers:—Stamens 15-20 on a hairy receptacle. Ovary 2-celled, hairy; styles bifid to the base. Drupe 2-2 $\frac{1}{2}$ in. diam. Seeds large, oily.

Uses:—The oil obtained from the kernels by expression, has been found in doses from one to two ounces to act as a mild and sure purgative, producing in from three to six hours after ingestion free bilious evacuations. It was found to approach nearly to Castor oil in the mildness and certainty of its operation, but superior to it as having neither taste nor smell, and as producing its cathartic action without any nausea. It may be worthy of further attention. (Ph. Ind.)

A French chemist has made the following analyses of the kernels:—

Water	...	...	...	5.000
Oil	...	...	...	62.175
Nitrogenous material	...	...	...	22.653
Non-Nitrogenous material	...	...	...	6.827
Ash	...	...	...	3.345

100.000

Specific gravity of the oil 0.940.

The results obtained at the Imperial Institute by the analysis of oil extracted from the present sample of seeds, and those obtained by investigators who have examined Candle-nut oil previously, are given in the following table:—

	Oil from <i>Aleurites triloba</i> , examined at the Imperial Institute.	Oil from <i>Aleurites moluccana</i> , examined by		
		Lewkowitsch.	De Negre.	Fendler.
Specific gravity ...	0.9274 (15°C.)	0.92565 (15.5°C.)	0.920 (15°)	0.9254
Acid value ...	1.72	...	...	...
Saponification value	204.2	192.62	184-187.4	194.8
Iodine value ...	139.7	163.7	136-139	114.2
Rehner value ...	96.4	95.5	...	...
Wollny-Reichert value	1.98	...	...	...
Titer test ...	17.8°C	...	20°-21°C.	1.8

These results indicate that the oil belongs to the class of drying oils typified by linseed oil, and would be suitable for the manufacture of soft soap and in the preparation of oil-varnishes, paints and linoleum and other similar purposes, to which oils of this class are applied industrially. (Agricultural Ledger—1907—No. 4.)

1146. *Croton reticulatus*, Heyne, H.F.B.I., v. 386.

Vern. :—Pándhari or pándharisálá (Mar.).

Habitat :—Deccan Peninsula, from the Concan southwards.

A shrub with slender, terete branches. Branchlets, leaves beneath and inflorescence silvery, lepidote. Leaves ovate or elliptic-lanceolate, acuminate, quite entire, shortly 3-nerved at the base, opposite and alternate, 4-10in., smooth and glabrous above, base acute or rounded; petiole $\frac{1}{2}$ -1 $\frac{1}{2}$ in., rusty, lepidote. Racemes few-fid, shorter than the leaves. Sepals of male oblong; margins woolly, twice as large as the woolly oblong petals. Stamens glabrous except at the villous base, 15-18. Sepals of female linear, oblong, accrescent in fruit, sometimes $\frac{1}{2}$ in. long. Ovary globose, stellately lepidote. Styles very variable, usually 2-partite, with long, slender, unequally 2-fid arms. Capsule $\frac{1}{2}$ in. long, broadly oblong, stellately lepidote.

Use :—The bark is used as a bitter and stomachic. (S. Arjun.)

1147. *C. oblongifolius*, Roxb., H.F.B.I., v. 386, Roxb. 688.

Vern. :—Chucka (Patna); Baragach (B.); Arjunna (Oudh); Ach (Nepal); Kurti, konya, kuli, poter (Kol.); Putri (Lohardugga); Gote (Santal); Kote, putol (Mal.); Burma, parokupi (Ass.); Bhutan kusam (Tel.); Gonsur (Goa); Ganasura (Mar.).

Habitat :—Bengal, Ceylon, Behar, Central India and the Deccan Peninsula.

A small, deciduous, often gregarious tree. Bark lin. thick, grey or brownish, inner bark red, coarsely fibrous. Wood yellowish-white, moderately hard. Branches rather stout. Shoots, young leaves, branchlets, inflorescence, calyx and ovary densely clothed with minute, orbicular, silvery scales. Leaves rather coriaceous, pale-green, glabrous when full grown, oblong-lanceolate, penninerved, more or less serrate, blade 5-10in.; petiole

1-2in. long, very variable, $\frac{1}{2}$ -2 $\frac{1}{2}$ in., rather slender. Racemes often fascicled, elongate erect; pedicels long or short. Stamens 10-12, woolly below, glabrous above. Sepals of male broadly oblong; petals as long as sepals, woolly; disk glands 5, rounded. Sepals of female oblong; petals small, linear ciliate; disk depressed. Ovary oblong, 3-gonous, styles 2-partite. Capsule globose, $\frac{1}{3}$ in. diam., lepidote, 3-lobed; top depressed.

Uses:—The seeds and fruits are purgative.

"The Goanese and inhabitants of Southern Concan administer the bark in chronic enlargements of the liver and in remittent fever. In the former disease, it is both taken internally and applied locally. As an application to sprains, bruises, rheumatic swellings, etc., it is in great request." (Dymock.) In the Southern Concan, it has a reputation as a remedy in snake-bites (Pharmacogr. Ind. III 287).

The Santals use the bark and root as a purgative and as an alterative in dysentery. (Campbell.)

1148. *C. caudatus*, Geisel., H.F.B.I., v. 388.

Syn.:—*C. drupaceum*, Roxb. 688.

Vern.:—Nan bhantúr (Beng.); Takchabrik (Lepcha); Wusta (Uriya).

Habitat:—Eastern Himalaya; Sikkim and Bhotan. Assam, Bengal and Sylhet to the Deccan.

A large straggling shrub, more or less scandant. Stem often attaining 1-1 $\frac{1}{2}$ ft. Girth, branchlets, petioles, young leaves and inflorescence rough with stellate hair. Bark thin, grey. Wood white or yellowish-white, hard, close-grained. Leaves very variable, smaller 1-3in., ovate-cordate; larger 4-7in., orbicular-cordate; margin denticulate or rather coarsely toothed, often with a gland at the sinus or the teeth glandular, upper surface smooth or scaberulous, lower scabrid or tomentose; nerves 2-3 pair above the basal, pubescent above; glands minute. Petiole 1-2in., scabrid; stipules laciniate, glandulose. Racemes very long, slender, 4-10in. solitary, terminal. Bracts subulate or O. Pedicels long or short. Male flowers tomentose; sepals and petals of equal length. Disk-glands minute; receptacle villous with white hairs. Stamens 18-30, often far exserted; filaments

silky below. Female flowers :—sepals ovate, or oblong sub-acute, scabrid ; petals very minute, subulate, long-ciliate ; disk low, hirsute. Ovary densely woolly ; styles bifid, arms long, slender. Capsule large, globose, or broadly oblong, woody, $\frac{3}{4}$ -lin. long or broad, terete or with 6 slender ridges, densely rusty, scabridly pubescent, 6-valved, from the top downwards. Seeds very variable, dorsally compressed, slightly rugose. The variable fruit is the remarkable character of this plant. (J. D. Hooker.)

Use :—Mr. Home says the leaves are applied as a poultice to sprains.

1149. *C. Tiglium*, Linn., H.F.B.I., v. 393 ; Roxb. 688.

Sans. :—Jayapála ; Kanakaphala.

Vern. :—Jaypál (B.) ; Jamál-gota (H. and Mar.) ; Napál (Guz. and Kan.) ; Nerválam (Tam.) ; Nepála-vitna (Tel.) ; Nir válam (Mal.)

Habitat :—Bengal, Assam and southward to Malacca, Burma and Ceylon.

A small, evergreen tree. The youngest shoots sparsely stellately hairy. Leaves membranous, glabrous, ovate, acuminate, more or less serrate, 2-4in., glands minute, sessile, 3-5 basal-nerves. Petiole 1-2in. slender. Racemes 2-3in. Rachis glabrous ; bracts subulate. Male flowers :—pedicels stellately hairy ; sepals nearly glabrous, tips bearded ; petals narrow, woolly-edged. Stamens 15-25, glabrous, receptacle, villous ; disk-glands 5, small. Female flowers :—Sepals villous at the base within. Petals 0. Disk obscure, annular. Styles slender, 2 partite. Ovary, stellately hispid and oblong. Capsule $\frac{3}{4}$ -lin. long, white, turbinate obovoid, obtusely trigonous. Seeds $\frac{1}{2}$ - $\frac{2}{3}$ in., oblong, obtusely trigonous, pale.

Use :—The seeds and oil are officinal in both the Pharmacopeias and their uses are too well known to be mentioned here.

1150. *Crozophora tinctoria*, A. Juss., H.F.B.I., v. 408.

Vern. :—Tappal buti, nilam, kukronda (Pb.) ; Shadevi, sonballi, subali (H.)

Habitat :—The Punjab, Salt Range, Sindh and the Deccan.

An annual, prostrate herb. The whole plant softly clothed with stellate tomentum. Root stout. Branches 6-10 in. Leaves thick, softly tomentose on both surfaces, $1\frac{1}{2}$ - $2\frac{1}{2}$ in. long, from ovate and sinuate-toothed or entire to rounded and obtusely-lobed. Petiole often 3 in. Racemes short, lengthening in fruit. Male flowers numerous; calyx globose, segments 5, valvate; petals 5; disk obscure; stamens 5-20. Female flowers:—pedicels at length decurved and sometimes 3 in. long in fruit; calyx and petals of the male. Ovary and capsule stellately tomentose and clothed with silvery scales; capsule $\frac{1}{2}$ in. diam. (J. D. Hooker.)

Uses :—Lindley mentions it as possessing emetic, drastic and corrosive properties.

Dr. J. Hornsey Casson, Physician to Her Majesty's Legation in Persia, called the attention of the Director of Kew gardens to this plant which caused the death of 6 persons with symptoms of severe jaundice, abdominal pain, bilious vomiting, dilatation of pupil, bleeding from the nose, bloody urine tinged with bile and stupor. (Ph. J. Dec. 28, 1889, p. 504.)

1151. *C. plicata*, Muell., Arg., H.F.B.I., v. 409.

Syn. :—*Croton plicatum*, Willd. Roxb. 687.

Vern. :—Shahdevi, súbali, sonballi (H. and Sind); Okharada (Guz.); Khúdiokra (B.); Pango nari (Santal); Pút kanda, nilkhanti, nil-ak-rai (Pb.); Gurugu chettu, linga miriyam (Tel.).

Habitat :—Throughout India, from the Punjab to Travancore and from Bengal to Pegu and Burma.

An erect hoary annual herb up to 2 ft. high, with a long straight slender tap-root. Stem usually naked below, sparingly branched above. Leaves 2-4 in. long, ovate to orbicular, often obscurely 3-lobed, thick, rugose, pale-green, stellate-hairy on both surfaces; petioles 1-2 in. long. Male flowers:—Calyx $\frac{1}{8}$ in. long. Petals smaller, very thin, ovate-lanceolate. Stamens 15, in two whorls. Fem. flowers:—Sepals $\frac{1}{2}$ in. long, triangular. Petals shorter and narrower. Capsules $\frac{1}{2}$ in. in diam., densely stellate-hairy, but without silvery scales. (Duthie).

Uses :—The ashes of the root are given to children for cough. The leaves are considered depurative. The seeds are used as purgative. (Stewart.) Its value in leprosy is asserted. (Drury.) The Santals mix the root with that of *Carissa Carandas* for blistering purposes. (Revd. A. Campbell.)

1152. *Acalypha fruticosa*, Forsk., H.F.B.I., V. 415.

Syn. :—*Acalypha betulina*, Retz. ; *A. amentacea*, Roxb. 686.

Vern. :—Chunm maram (Tam.) ; Chinni ; Tsiuni (Tel.) ; Chinni-ká-jhar (Dec.).

Habitat :—Deccan Peninsula.

A low shrub, more or less covered with yellow, waxy glands, strong smelling or foetid when bruised, very much-branched ; branches slender, virgate, spreading or ascending, glabrous ; young parts scurfily pubescent. Leaves alternate, numerous, but rather distant, $\frac{3}{4}$ -2 in., oblong or rhomboid-ovate, acute at base, shortly acuminate, coarsely or finely crenate-serrate, glabrous, with small punctiform, orange, scattered glands beneath. Petiole $\frac{1}{4}$ -1 $\frac{1}{4}$ in., slender. Stipules minute, persistent. Flowers minute, sessile, on strict pedicels in clusters, crowded on short axillary spikes ; male very numerous, with minute bracts. Stamens 8. Female 2 or 3 at base of spikes, each with toothed bracts ; styles 3, split into many filiform segments. Capsule with 3 rounded lobes, densely pubescent ; seeds smooth. (Trimen).

Uses :—Leaves attenuant and alterative and an agreeable stomachic in dyspepsia and other ailments. The dose of the infusion of the leaves as ordered by the Vaidyas in Southern India is half a teacupful twice in the day. (Ainslie.)

1153. *A. indica*, Linn., H.F.B.I., V. 416 Roxb., 685.

Syn. :—*A. spicata*, Forsk. ; *A. ciliata* and *A. canescens*.

Vern. :—Kuppi, khokali (H.) ; Khokli, khájoti (Mar.) ; Vanchhi kánto (Guj.) ; Muktajuri, shet basanta, murkanta (Beng.) ; Indra-marís (Uriya) ; Kuppaimeni (Tam.) ; Kuppai-chettu, murkanda-chettu, (Tel.) ; Chalmari, kuppi (Kanara).

Habitat :—A small annual shrub occurring as a weed in gardens and road-sides throughout India.

A pubescent, herbaceous, erect annual, 1-3ft. Branches numerous, long, ascending, angular, finely pubescent. Leaves $1\frac{1}{2}$ -3in., rhomboid-ovate, tapering at base, acute, serrate, glabrous, thin, somewhat 3-nerved at base, pale-green. Petiole usually longer than leaves, slender, spreading. Stipules minute. Flowers sessile, green, in numerous lax, erect, axillary spikes; males very small, clustered near summit. Stamens 8; females solitary, scattered, each with a large, leafy, truncate, dentate bract. Ovary hispid. Capsule small, quite concealed by enlarged bract, often only 1-seeded. Seed ovoid, acute, smooth.

A common weed flowering all the year round.

Uses :—There is no mention of this plant in Sanscrit works on Medicine. It is used as expectorant as a substitute for senega. It has also a diuretic action. It is a useful remedy for bronchitis, asthma and pneumonia; also for rheumatism. It was formerly employed as a purgative and anthelmintic.

"The roots, leaves, and tender shoots are all used in medicine by the Hindus. The powder of the dry leaves is given to children in worm cases, also a decoction prepared from the leaves with the addition of a little garlic. The juice of the same part of the plant, together with that of the tender shoots, is occasionally mixed with a small portion of margosa oil, and rubbed on the tongues of infants for the purpose of sickening them and clearing their stomachs of viscid phlegm. The *hakims* prescribe the *koopamaynee* in consumption." (Ainslie, Mat. Ind. II., 161.) "The leaves with garlic are regarded as anthelmintic; mixed with common salt the leaves are applied externally in scabies, and the juice rubbed up with oil is used externally in rheumatism." (Balf. Cycl.) According to Rheede, the root is used as a purgative on the Malabar Coast. (Hort. Mal., X., 161.) This property "is confirmed by Dr. H. E. Busteed, who has used it as a laxative for children." A contributor in Dacca informs me he uses it as a laxative, and in an official correspondence with the Government of India, Rai Kanai Lal De, Bahadur, includes the *muktajhuri* amongst emetics. In

Bombay "the plant had a reputation as an expectorant, hence the native name khokli (cough)." (Dymock, *Mat. Med. W. Ind.*, 588.) "Dr. George Bidie furnishes the following remarks: 'The expressed juice of the leaves is in great repute, wherever the plant grows, as an emetic for children, and is safe, certain and speedy in its action. Like Ipecacuanha, it seems to have little tendency to act on the bowels or to depress the vital powers, and it decidedly increases the secretion of the pulmonary organs. Probably an infusion of the dried leaves or an extract prepared from the green plant, would retain all its active properties. The dose of the expressed juice, for an infant, is a teaspoonful.'" (*Pharm. Ind.*) A decoction of the leaves is given in ear-ache; a cataplasm of the leaves is applied as a local application to syphilitic ulcers, and as a means of relieving the pain of snake-bite. (*Drury.*) According to Nimmo the roots "attract cats quite as much as those of valerian." (*Voigt*, 160; *Treasury of Botany.*)

"Much used by Mahomedan practitioners in treating cases of acute mania in early stage. The fresh juice (3i) with (6 gr.) chloride of sodium dissolved in it and dropped in both nostrils every morning, followed by cold shower-baths for three mornings regularly, proves highly successful. Thus it is supposed by them to act as a 'brain purge,' so called probably owing to a quantity of mucus and other matter escaping from the nostrils immediately after the application of the above recipe. I have given it internally; it acts as an anthelmintic and laxative." (*Surgeon E. W. Savinge, Rajamundry*, "Juice of the fresh plant emetic, laxative; dose one to four drachms, according to age. Fresh leaves ground into a paste, made into a ball, to the size of a large marble and introduced into the rectum, very useful in relieving obstinate constipation of children." (*Apoth. Thomas Ward, Madanapalle, Cuddapah.*) "The juice or the bruised leaf is applied to the skin to allay the irritation caused by the bite of the centipede." (*Surgeon Ruthnam T. Moodelliar, Chingleput.*)

"The juice of the fresh leaves mixed with lime is applied in painful rheumatic affections." (*Surg.-Maj. John Lancaster,*

M. B., Chittur.) "Used in scabies and ringworm, also internally as a carminative." (Surg.-Maj. F. F. L. Ratton, Salem.) "The root possesses purgative properties; the leaf-juice is a safe, useful emetic, especially adapted for children." (Surg.-Maj. F. M. Houston, Travancore, and Mr. John Gomes, Trivandrum.) "The juice of the fresh plant is given to children as an emetic in $\frac{3}{4}$ to 1 doses." (Apoth. F. Norman, Chattrapur, Ganjam.)

"This plant is called in Kanara *chalmari* as well as *kūppi* (the latter word means a 'heap,' the plant being found in waste places and rubbish heaps). The natives use it in congestive headaches: a piece of cotton is saturated with the expressed juice and inserted into each nostril, relieving head symptoms by causing hæmorrhage from the nose. The powder of the dry leaves is used in bed sores and wounds attacked by worms. In asthma and bronchitis I have employed it with benefit both in children and adults.

"Mode of preparation.—Macerate 3 oz. of the fresh leaves, stalks, and flowers, with a pint of spirits of wine, in a closed jar for 7 days, occasionally agitating the same. Strain, press, filter, and add sufficient spirits of ether to make one pint.

"Physiological effects.—In small doses it is expectorant and nauseant: in large doses emetic.

"Dose.—Minims 20 to 60, frequently repeated during the day in honey." (Surgeon-Major E. H. R. Langley, Bombay.) "One drachm of the expressed juice of the fresh leaves is an easy and rapid emetic in children. The bruised leaves are useful as an application to maggot eaten sores." (Surgeon W. D. Stewart, Cuttack.)

"The root, bruised in hot water, is employed as a cathartic, and the leaves as a laxative in decoction mixed with common salt. The leaves are used in scabies, and mixed with *chunam* in other cutaneous diseases (Drury)."

Chemical composition.—The whole plant of *A. Indica* was dried at a low temperature, reduced to powder, and exhausted with 80 per cent alcohol. The alcoholic extract was mixed with water, acidulated with sulphuric acid, and agitated with petroleum ether, and ether; the solution was then rendered alkaline and agitated with ether. During agitation with petroleum ether, a quantity of dark matter separated, which was partly soluble in ether, and in alkalies, and contained much colouring matter. The petroleum ether extract

was dark and viscid, and had an aromatic odour, but did not yield any crystalline deposit on standing : in absolute alcohol it was soluble, and on spontaneous evaporation some yellow matter separated, which was destitute of crystalline structure on microscopic examination. The alcoholic solution had no special taste. The ether extract was yellow, and had an aromatic somewhat tea-like odour, and on standing became indistinctly crystalline. In warm water a portion dissolved, the solution possession a strong acid reaction, and affording a dirty reddish coloration with ferric chloride : it did not precipitate gelatine, and gave no reaction with cyanide of potassium. The portion insoluble in water was dissolved by ammonia, affording a deep yellow coloured solution with a somewhat camphoraceous odour, the addition of acids causing the precipitation of whitish flocks.

The ether extract obtained from the original aqueous solution, after it had been rendered alkaline, contained a well-marked alkaloidal principle, which after purification afforded the following reactions : with Fröhde's re-agent pinkish in the cold, dirty blue on warming ; with sulphuric acid yellowish-red ; no reaction with sulphuric acid and potassium bichromate ; no reaction with ferric chloride ; with nitric acid a yellow coloration ; it was not precipitated by chromate of potash from an aqueous solution acidulated with sulphuric acid ; taste harsh, without bitterness. We propose provisionally to call this principle *Acalyphine* (*Pharmacogr. Ind.* III. 293-294.)

1154. *A. hispida*, *Burm.*, H.F.B.I., V. 417.

Syn. :—*Caturus speciflorus*, *Linn.*, *Roxb.* 714.

Vern. :—Watta-tali (Mal.).

Habitot :—Cultivated in gardens.

"This is included by J. D. Hooker (see p. 417, Vol. V., F. B. In.) among the doubtful and excluded species" with the following remark :—" *Caturus speciflorus* *Roxb.* Fl. Ind. 111, 760, with very long spikes minute bracts and very long styles is a garden plant only in India." Roxburgh's description is as follows :—"Shrubby. Leaves long-petioled, cordate, serrate. Spikes pendulous, longer than the leaves." Male calyx absent ; Corolla trifold. Female calyx three or four parted ; corolla absent. Styles three. Capsule tricocous. With regard to the figure of *Acalypha hispida* *Burm.*, from Burmans' *Flora Indica*, 1768, which is reproduced in this work (Plate 875A), Roxburgh says that same would be a tolerable representation of the female if the spikes were longer and pendulous."

Uses :—Flowers said to be specific in diarrhoea and similar disorders ; boiled in water or administered in the form of a

conserve. (Lindley.) Its leaves are beaten up with green tobacco leaf and infusion of rice and applied to inveterate ulcers. (Rheede).

1155. *Trewia nudiflora*, Linn., H.F.B.I., v. 423.

Sans. :—Pindâra, Karahâta, Kurangaha.

Habitat. :—Common in the hotter parts of India.

A deciduous dioecious moderate-sized tree. Bark smooth grey. Wood white soft not durable. Young shoots, inflorescence and sometimes full-grown leaves clothed with flocculent cottony wool or sometimes nearly glabrous. Leaves ovate, opposite, 5-7in., cordate at base, entire, acuminate, glabrous above, finely stellate-hairy on veins beneath, thin, bright green, somewhat 3-nerved at base. Petiole cylindric, 2-3in., finely pubescent. Stipules minute, acute, soon falling. Male flowers :—on slender horizontal pedicels. Racemes spicate, 4-6in., buds globose. Sepals valvate, concave. Female flowers :—Ovary globose, densely stellate-hairy style yellow thick erect, stigmas very long $\frac{1}{2}$ - $\frac{3}{4}$ in. Fruit about $\frac{1}{2}$ in., roughish with scattered stellate hairs. Seed brown, broad pericarp thick, almost woody. Flowers pale green.

Uses. :—It is described in the Nighantas as sweet and cooling, useful for the removal of swelling, bile and phlegm; the root is prescribed in gouty or rheumatic affections.

Rheede states that the root in decoction is used to relieve flatulence, and is applied locally in gout (Pharmacographia Indica, Vol. III., p. 295).

1156. *Mallotus philippinensis*, Muell., H.F.B.I., v. 442.

Syn. :—Rottlera tinctoria, Roxb. 737; R. aurantiaca, Hook. and Arn; R. affinis, Hassk.; R. Montana and Mollis, Wall.; Croton philippinensis, Lamk.; C. Punctatus, Retz.; C. coccineus, Vahl.; C. montanus, Willd; C. distans, Wall.; C. cascarilloides, Rauesch.

Sans. :—Kapilâ, Kampilla rechanaka Madhukah (Punnaga

is incorrectly given in many books as Sanskrit for this plant,—see *Calophyllum inophyllum*).

Vern.:—Kambilá, kamúd, kamelá, rori rohini, chamar gular, hingur, sendúr, kúnkú, sinduri, kambhal, vasanta-gandha (powd.), (H.); Dhola sindur, kamila, túng, kesar (=saffron), kamalá guri (the dye powder), (B.); Kumala, súndragundi, bosontogundi, (Ur.); Rora, (Sant.); Gangai, puddum, jaggarú, hibang, lasso, (Ass.); Chinderpang, machugan, (Garó); Sinduria, safed mallata, (Nep.); Puroa, tukla, numboongkor, (Lep.); Baraiburi, sindurpong, (Michi); Koku, (Gond); Kaimbil, (Kash); kamela, kambila, kámal, reini, rúlya, (Pb.); Kámbaila (Push.); kamala, kunkuma, kapil, shendri, shindur; (Mar.); kapilo, (Guz.); kapila, kamela-mavu (? pod=pollen), thavittai, kuran gumanjanathi kapila rung, kapilapodi, thiruchúrna maram, (Tam.); kúnkuma, kapila, vasantagandhamu (powder), chendrasinduri, sundragundi, (Tel.); rangamále, corunga-manje, sarnakesari, hulichellu, kunkuma, kesalay, kamela, (Kan.); Ponnagam (? *Calophyllum inophyllum*), (Mal.); tawthidin, pothidin, thidinbmok (the dye) (Burm.); Tawthadin, (Shan); Hamparandella, (Sing.).

Dr. Buchanan-Hamilton called the tree corunga munji maram or "Monkey face tree," because these animals paint their faces red by rubbing them with the fruit.

Habitat:—A small, evergreen tree, found throughout tropical India; along the foot of the Himálaya from Káshmir eastwards (ascending to 5,000 feet); all over Bengal and Burma, Singapore, and the Andaman Islands; and from Sind southwards to Ceylon. Distributed to China, the Malay Islands, and Australia.

A large shrub or small evergreen tree, 25-30ft., with usually "buttressed" trunk, says Gamble. Bark $\frac{1}{4}$ in. thick, grey, inner substance red, marked with irregular cracks. Wood smooth; grey to light red, hard, close-grained, no heartwood. Young shoots, inflorescence, and sometimes fullgrown leaves beneath clothed with flocculent cottony wool. Branches rather slender. Leaves 3-9in. long, alternate, ovate, ovate-oblong or lanceolate, acuminate entire or sinuate-toothed, glabrous above, beneath subglaucous, puberulous covered with scarlet glands,

base narrowed acute obtuse; Basal nerves 3, midrib penninerved. Petiole 1-3 in. Flowers small, dioecious in terminal often panicle brown brick-red stiff spikes. Calyx 3-cleft. Petals distinct, and globose. Female flowers solitary. Ovary 3-celled. Cells 1-ovuled. Styles 3, papillose inside. Fruit 3-lobed, Capsules loculicidally 3-valved $\frac{1}{8}$ - $\frac{1}{2}$ in. diam., densely covered with a bright red or crimson powder when ripe. "The bright red or crimson powder consists of resin mixed with stellate hairs." (Brandis). Seeds globose, smooth, black.

Uses:—The powder prepared from the tricoccous fruit is used as an anthelmintic, vermifuge and purgative medicine. It is also said to possess cathartic properties.

Rottlerin, $C_{11}H_{10}O_3$, the principal constituent of Kamala, crystallises in thin, salmon-coloured plates melting at $191-191.5^\circ$. When heated with caustic potash at 150° , it yields benzoic acid, acetic acid, and an amorphous substance, and when oxidised by means of hydrogen peroxide in alkaline solution the same compounds are obtained. On treatment with cold nitric acid (sp. gr. 1.5), rottlerin yields, besides oxalic acid, two new acids melting at 282° and 226° and having respectively the formulæ $C_{17}H_{14}O_9$, and $C_{17}H_{16}O_9$. These are readily separated by recrystallisation from alcohol. Boiling nitric acid of sp. gr. 1.5 decomposes rottlerin, forming oxalic acid and a bibasic acid of the formula $C_{13}H_{10}O_9$, melting at 232° , and yielding a crystalline silver salt, $C_{13}H_8O_9Ag_2$. When heated with acetic anhydride, rottlerin yields a diacetyl derivative of the formula $C_{11}H_8O_5 (C_2H_3O_2)_2$. The molecular weight of rottlerin has not yet been satisfactorily determined, but probably about 485.

The resin of low melting point agrees with the formula $C_{12}H_{12}O_3$. It resembles rottlerin, from which its formula differs by CH_2 .

The yellow crystalline colouring matter obtained in the first extractions of Kamala with carbon bisulphide is closely allied to rottlerin. It forms a beautiful, glistening mass of yellow needles, and melts at $192-193^\circ$.

The wax extracted gave as a mean $C=79.70$ p.c., $H=12.86$ p.c., agreeing with the formula $C_{23}H_{34}O_2$. This wax is a colourless, apparently crystalline mass melting at 82° .

Irorottlerin $C_{12}H_{12}O_3$, crystallises in groups of minute plates melting at $198-199^\circ$, and in its appearance greatly resembles rottlerin, from which, however, it is readily distinguished by being practically insoluble in carbon bisulphide, chloroform, and benzene, whereas rottlerin is comparatively soluble in these liquids.

The resin of high melting point is a pale yellow, amorphous substance of the formula $C_{13}H_{12}O_4$, closely allied to rottlerin in many of its properties, and which also yields the acid of the formula $C_{13}H_{10}O_9$, when boiled with nitric acid of sp. gr. 1.5.

Kamala was first analysed by Dr. Thomas Anderson of Glasgow in 1855 who found the following constituents in 100 parts:—78·19 of resinous colouring matter, 7·34 of albumen, 7·14 of cellulose, a trace of volatile oil, 3·84 of ashes, and 3·49 of water. Of the resinous colouring matters Dr. Anderson obtained one in a pure state by allowing a concentrated ethereal solution to stand for two days, drying and pressing in bibulous paper the resulting mass of granular crystals, and purifying them from adhering resin by repeated solution in ether and crystallisation. To this substance he gave the name of Rottlerin. It occurs in crystalline plates of a yellow colour insoluble in water, but soluble in alcohol, ether and alkaline solutions. The formula was $C_{11}H_{10}O_3$.

E. G. Leube, Jr. (Jahresbericht, 1860, 562), however, was unable to obtain any crystalline product, but he describes a resin melting at 80° , having the formula $C_{15}H_{13}O_4$, and a resin melting at 191° , of the formula $C_8H_{12}O_5$. Oettingen of Russia, in 1862, was unable to obtain any crystalline substance from kamala.

A. G. Perkin and W. H. Perkin, Jr., in 1886 made a preliminary examination of kamala and separated by means of carbon bisulphide a yellow crystalline body Mallotoxin. On pursuing the investigation, Mr. A. G. Perkin contributed a full account of the constituents in Journ. Chem. Soc. LXIII. (1893), pages 975-90. Rottlerin, the principal constituent, crystallises in salmon-coloured plates melting at $191-191\frac{1}{2}^\circ$. When heated with caustic potash it yields benzoic acid, acetic acid and an amorphous substance. A resin of low melting point with the formula $C_{12}H_{12}O_3$ and closely associated with Rottlerin in many of its properties. When boiled with dilute alkalis the odour of benzaldehyde is noticeable.

A yellow crystalline colouring matter present in minute amount melting at $192-193^\circ$.

A wax, having a composition agreeing with the formula $C_{28}H_{54}O_2$, and melting at 82° , the melting point of cetylic cerotate.

The residue left on extracting kamala with carbon bisulphide contains two substances isorottlerin and a resin of higher melting point both soluble in ether.

Isorottlerin crystallises in groups of minute plates melting at $198-199^\circ$. It differs from rottlerin by being practically insoluble in carbon bisulphide, chloroform and benzene.

The resin of high melting point is a pale yellow amorphous substance of the formula $C_{13}H_{12}O_4$.

In a subsequent paper on the chemistry of kamala [Journ. Chem. Soc. LXVII (1895), 230], Perkin continued the study of Rottlerin, the principal crystalline constituent, and showed the action upon it of nitric acid and sodium carbonate, the former yielding ortho and para-nitrocinnamic acids and the latter rottlerone. The yellow crystalline colouring matter contained more hydrogen than Rottlerin and is probably a reduction product of this body. The name homo-rottlerin was given to it.

In a further note on Rottlerin (Journ. Chem. Soc. 1899, LXXV., page 827) Perkin deduced from analyses of its mono-substituted salts the formula C_{33}

$H_{35}O_9$. It contains hydroxyl groups. By fusion with alkalis at 220-240° it yields acetic and benzoic acids together with phloroglucinol. (The *Agricultural Ledger*, 1905. No. 4. pp. 61-62.)

The ash of Kamala contains a considerable proportion of manganese.

When extracted with ether, Kamala yields a dark, brownish, resinous product from which six distinct substances can be isolated. Five of these, namely, rottlerin, isorottlerin, a wax, and two resins, one of high and the other of low melting point, form the principal constituents, but there is also present a trace of a yellow, crystalline colouring matter.

Kamala contains also a minute amount of an essential oil or similar substances, giving to it when gently warmed a peculiar odour, but from which it can be readily freed by treatment with steam.

Kamala contains, moreover, a small quantity of a sugar, which is extracted from it by water.

Seeds.—The seeds, of which three are contained in each capsule, are black or dark grey, rounded, and slightly flattened on one side. They are about the size of black pepper. Their resemblance to the fruits of *Embelia Ribes* has been observed in the Panjab where the confusion of the names—baobrang for *Mallotus* and bebrang for *Embelia*—has existed. In Katha, Burma, the seeds ground to a paste are applied to wounds and dah cuts.

Greshoff, in 1898, discovered in the seeds a bitter glucoside soluble in water and alcohol, that may be shaken out of a water extract by chloroform.

The seeds analysed in the Indian Museum afforded:—Moisture, 8.75; fat 5.85; albuminoids, 16.81; carbohydrates, 47.49; fibre, 17.35; ash, 3.75. They are, therefore, not oil-yielding seeds as has been reported.

1157. *Macaranga Roxburghii*, Wight. H.F.B.I., v. 448.

Vern.:—Chandkal (Kanara); Chándwar, chandâdâ (Mar.); Vattekkanni (Tam.); Boddichettu (Tel.); Chentha-kanni (Mysore).

Habitat:—The Deccan Peninsula; in the Circars and on the ghats, from the Concan to Travancore.

A small or middle-sized resinous tree. Wood reddish brown or soft. Branchlets stout, glaucous, youngest shoots stellatomentose. Leaves deltoid-or rhombic-ovate or orbicular, broadly peltate, cuspidate, palmati-nerved, entire or minutely toothed; 5-8 in. diam., coriaceous or thin, glabrous above, except the pubescent nerves, and eglandular at the rounded base, beneath finely pubescent or glabrate and gland-dotted with 6-8 pairs of

strong nerves above the basal, and strong cross nervules. Petiole 3-6in., glabrous or puberulous. Stipules ovate or oblong lanceolate, not broad, tomentose. Panicles densely rusty-tomentose or the branches nearly glabrous. Bracts at the axils and at the bases of the terminal branches very broad, dentate, and often veined, floral hemispheric. Bracteoles concave. Flowers $\frac{1}{8}$ in. diam. Male flowers:—Clusters enveloped in bracts and bracteoles; sepals 3; stamens 2-5. Female flowers:—panicles simpler, in racemose branches with larger bracts. Calyx-limb obsolete; ovary densely glandular, 1-celled, glabrous or puberulous; style lateral. Stigma sessile, persistent, often embracing one side of the ovary, thickly papillose. Capsule globose, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., covered with hairs and glands. Seed globose; testa brown, crustaceous, rough.

Uses:—The gum powdered and made into a paste is reckoned a good external application for venereal sores (Drury.)

The country people used the following in *jarandi* (Liver):—One part of the young shoots, with three parts of the young shoots of *khoreti* (*Ficus asperimma*) are sprinkled with hot water and the juice extracted; in this is rubbed down two parts each of the barks of both trees. The preparation may be administered twice a day in doses of $\frac{1}{2}$ th of a seer. (Dymock.)

1158. *Ricinus communis*, Linn., H.F.B.I., v. 457; Roxb. 690.

Vern.:—Arand; Eranda.

Habitat:—Cultivated throughout India and naturalized near habitations.

An evergreen, small tree. Shoots and panicles glaneous. Leaves green or reddish, 1-2ft. diam., membranous, lobes from oblong to linear-acute or acuminate, glandserrate; petiole 4-12in. Racemes stout, erect. Male flowers:— $\frac{1}{2}$ in. diam., being above the female in the same panicle. Stamens numerous. Female calyx $\frac{1}{2}$ in. long. Ovary 3-celled; styles spreading, feathery, often highly coloured, principally crimson. Capsule globose, generally echinate, $\frac{1}{2}$ -lin. long. Seeds mottled, oblong, smooth, with fleshy albumen.

Uses:—Official in both the Pharmacopœias, and its uses are too well known to be mentioned here.

"Leather has examined a large number of seeds from Madras, Bombay, United Provinces and Central Provinces, and shows that they contain from 25 to 35 per cent. of shells, and the kernels, with few exceptions, afford from 60 to 70 per cent. of oil, or 35 to 50 per cent. on the entire seed. Larger seeds as a rule contain more oil than smaller seeds.

Castor oil is a colourless or pale greenish oil having a taste at first mild, then harsh. The oil is very viscous, but does not dry even when exposed in thin layers. Most commercial samples contain only very small proportions of free fatty acids, this is due to the refining process which consists in the coagulation of albuminous matters by steaming and then removing them by filtration. Castor oil is strongly dextro-rotatory. Deering and Redwood examined twenty-three samples of Indian oil and observed that in a 200 mm. tube in a Hoffmann-Laurent polarimeter the variation was from $+7.6^{\circ}$ to $+9.7^{\circ}$. Castor oil may be said to consist of a small quantity of tristearin, of the glyceride of dihydroxystearic acid, and to a large extent of the glyceride of ricinoleic acid.

The physical and chemical constants of the oil have been found as follows: Specific gravity at 15.5° , 0.963 to 0.964; saponification value, 177 to 184; iodine value, 81.4 to 85.3; Richert-Meissl value, 1.1; Maumene test, 46-47; oleo-refractometer degrees at 22° , 41 to 42.5. Insoluble fatty acids: Melting point, 13° ; iodine value, 86 to 88.

The high specific gravity and acetyl value and its very high viscosity afford ready means of identification. It is also miscible in all proportions with glacial acetic acid and absolute alcohol, but is nearly insoluble in large quantities of petroleum ether, kerosene and higher boiling paraffin oils." (Agricultural Ledger, 1911-12 No. 5 pp. 164-165.)

Ricinin, $C_{17}H_{13}N_4O_4$ is the poisonous principle of the seeds. The pressed seeds yield 0.3 per cent., whereas the husks yield 1.5 per cent., of ricinin. To obtain the ricinin, the pressed seeds or husks are extracted with boiling water; the extract evaporated on the water bath, and the residue treated with alcohol. The alcoholic solution is then evaporated to dryness and the residue treated with caustic soda; by this means, the impurities are dissolved out, and the ricinin which remains behind may be crystallised from alcohol or water. It crystallises in glistening plates; melts at 194° , has a bitter taste, is readily soluble in water, alcohol, chloroform, benzene and ether; the aqueous solution is neutral and optically inactive. Ricinin may be sublimed when carefully heated; it is soluble in concentrated sulphuric acid, yielding a colourless solution, which becomes straw-yellow, and then bright claret red, on warming. The colourless sulphuric acid solution gives, with a crystal of potassium dichromate, a bright green coloration; this is suggested as a test for ricinin. Ricinin does not give the usual tests for alkaloids, neither does it form salts with strong mineral acids; it yields a bromo-derivative, $C_{17}H_{13}Br_2N_4O_4$, which melts at 247° , and a corresponding chloro-derivative, which melts at 240° . With mercuric chloride, it yields the compound, $C_{17}H_{13}N_4O_4 \cdot 2HgCl_2$, which melts at 204° . When oxidised, it yields a new acid, $C_{15}H_{14}$.

$N_4 O_4$, which is termed *ricinic acid*; the same acid may also be obtained by the hydrolysis of ricinin with caustic soda. It is a dibasic acid, which melts at 295° yields a silver salt, a barium salt crystallising with $4 H_2 O$, and a bromo-derivative, $C_{15} H_{12} Br_2 N_4 O_4$, melting at 180° . (J. Ch. S. 1896, A. I. 386.)

1159. *Baliospermum axillare.*, Blume. H.F.B.I., V. 461.

Syn.:—*B. montanum* Muell.-Arg., *B. polyandrum*, Wight; *Croton polyandros*, Roxb. 687.

Sans.:—Danti.

Vern.:—Danti, hakum or hakun (H. and B.); Konda-âmu-dam naypawlum, adavi-âmudam (Tel.); Poguntig (Lepcha); Jangli jamâlgota (U. P.); Danti (Mar.); Jamâlgota, dantimul (Bomb., Guj. and Cutch).

"The vernacular names of *B. Montanum*, *Croton tiglium*, *Jatropha glandulifera* and *J. curcas* are confounded with each other in most districts of India, particularly in the Madras Presidency." (Moodeen Sheriff.) Roots sold as *Danti-mul* in the Bazars.

Habitat:—Tropical and subtropical Himalayas, from Kashmir to Bhotan; from Assam and Khasia mountains to Chittagong. Deccan Peninsula from Behal and the Concan to Travancore.

A stout leafy undershrub 3-6ft. high with herbaceous branches from the root, glabrous except the young shoots and sometimes the leaves beneath. Leaves firmly coriaceous, very variable in size and shape; the upper 2-3in. long, lanceolate, penninerved; the lower 6-12in. long, often palmately 3-5 lobed and with sinuate-toothed margins; base rounded or cuneate; petioles 2-6in. long; stipules of 2 glands. Flowers usually monœcious, arranged in many axillary racemes or contracted panicles, all male or with a few females at the base. MALE flowers:—Calyx globose, $\frac{1}{10}$ in., 4-5-partite, often slightly hairy; segments finely mottled. Disk of 6 glands. Stamens about 20. FEM. flowers:—Sepals not enlarging in fruit. Disk thin, $\frac{1}{10}$ in. in diam. Ovary hairy; styles about $\frac{1}{8}$ in. long, thick, 2-partite, dull-red. Capsules $\frac{1}{8}$ - $\frac{1}{2}$ in. long, obovoid, usually hairy. Seeds $\frac{1}{8}$ in. long, smooth, mottled. (Duthie.)

Uses:—The seeds are used as a drastic purgative, but in over-doses are an acro-narcotic poison; they are sometimes used as a substitute for Croton Tiglium. They are also used externally as a stimulant and rubefacient. The oil is a powerful hydragogue cathartic and is useful for external application in rheumatism. Madden states that to the east of the Sutlej its leaves are in high repute for wounds, and its sap is believed to corrode iron. The root is considered cathartic, and is used in dropsy, anasarca, and jaundice.

"A decoction of the leave said to be useful in asthma."
(Asst.-Surg. Bhagwan Das, Râwal Pindi, Punjab.)

1160. *Tragia involucrata*, Linn., H.F.B.I., V 465; Roxb. 652.

Sans.:—Vrischi-kali.

Vern.:—Barhanta (H.); Bichati (B.); Kan churi (Tam.); Sengel, sing (Santal); Kinch-kure (Deccan); Kâñch kûri, khâj-kolti (Bomb.); China-dûla gondi, rêvati-dula gondi, trunadula, gondi, duruda-gunti, tella-dura dagondi (Tel.).

Habitat:—Throughout India, from the Punjab and Lower Himalaya of Kumaon, eastward to Assam, and southward to Burma, Travancore and Ceylon.

A perennial, evergreen twiner, more or less pubescent or hispid and with scattered stinging bristles, rarely almost glabrous. Leaves from linear-oblong to broadly ovate-cordate, acuminate, serrate, and from entire to deeply 3-fid or tripartite, with irregularly serrate or sub-pinnatifid lobes, 1-4in., membranous, protean in form. (J. D. Hooker.) Racemes 1-2in., slender, hispid or glabrous. Bracts small or minute. Male flowers minute, shortly pedicelled, sepals and stamens 3; pistillode 3-fid. Female flowers strigosely hispid, fruiting $\frac{3}{4}$ in. diam., stellately rigid, spreading, oblong, pinnatifid, rarely sub-entire.

Uses:—The root is valued in febricula and in itching of the skin. (Rheede). The Vytians reckon it amongst those medicines which they conceive to possess virtues in altering and correcting the habit, in cases of *mayghum* (cachexia) and in old venereal

complaints attended with anomalous symptoms. By the Hindu doctors of the Coromandel coast, it is given in quantity of half-a-teacupful of the decoction twice daily. (Ainslie.) The root forms the basis of an external application in leprosy while the leaves dried, reduced to powder, and mixed with ginger and *kaiphul* form an "errhine" which is prescribed in cases of headache. (Taylor.) In the Konkan, the root is used to aid the extraction of guinea-worm, a paste made from them being applied to the part. A paste with *tulsi* juice is also employed as a cure for itchy skin eruptions. (Dymock.) In Chutia Nagpur, the root is given when the extremities are cold during fever; also for pains in the legs and arms. (Campbell.)

The fruit rubbed over the head with a little water is useful in cases of baldness. (Dr. Thornton in Watt's Dictionary.)

Var. :—*Cannabina*.

Vern. :—Sirru-kánchari vayu (Tam.).

An erect or climbing shrub 4-5ft. high, not twining, more or less hispid and with stinging hairs. Stems stout, woody. Leaves palmately 3-partite, up to 3½ in. long; lobes toothed or pinnatifid, the mid-lobe much longer than the lateral ones. Male flowers and calyx of female flowers as in *T. involucrata*. Styles 3, slightly spreading, not revolute. Capsules ⅔ in. across, 3-lobed, hirsute; lobes globose. Seeds globose, smooth, ⅓ in. in diam. (Duthie).

Uses :—The root is considered diaphoretic and alterative, and is prescribed in decoction, together with other articles of like virtues to correct the habit; an infusion of it is also given as a drink in ardent fever in the quantity of half a tea-cupful twice daily. (Ainslie).

1161. *Sapium indicum*, Wild., H.F.B.I., v. 471
Roxb. 691.

Syn. :—*Excoecaria indica*, Muell.

Vern. :—Huruá; Batul (B.); Hurná (Bomb.).

Habitat :—Bay of Bengal, from the Sunderbans to Tenasserim. S. Konkan. (Bay plant is growing in the Konkans, but

is not indigenous within the limits of the Bombay Presidency (Talbot.)

An evergreen, glabrous tree, 20-25ft., with acrid milky juice. Bark white, smooth, grey, says Gamble. Wood soft, white with small, brown heartwood. Leaves $3\frac{1}{2}$ -5in., lanceolate, sub-acute at base, alternate, acute at apex, finely crenate, serrate, glabrous, shining above, venation translucent. Petiole $\frac{1}{2}$ in., bi-glandular at tip. Spikes 2-3in., leaf-opposite or sub-terminal. Flowers greenish-yellow, sessile, male numerous in clusters. Female flowers larger, usually 1 or 2 at base of the spike, sepals ciliate. Styles 3, very long. Capsule depressed, globose, not lobed, about 1in. diam., glabrous, blackish-green. Pericarp thin. Cocci thick and hard, woody. Seeds $\frac{1}{2}$ in., grey.

The woody fruit is characteristic, says Trimen. The young fruit is succulent, says Brandis, mentioned by Graham.

Uses :—The juice of this tree is reckoned of a very poisonous nature. The taste of the fruit is nauseous beyond description. The seeds are used for intoxicating fish. (Roxb.).

The kernels afford to ether 50·3 per cent. of a thick greenish-yellow oil, which, when smeared on glass, dried to a skin in two days. The iodine value was 130·4. This oil is worthy of further notice. (Agricultural Ledger, 1911-12 No. 5. p. 165.)

1162. *S. insigne*, Benth., H.F.B.I., v. 471.

Syn. :—*Excœcaria insignis*, Bedd.

Vern. :—Dúdla, bilodar, biloja (Pb.); Khinna, Khiria, Khirni Dudla (Bomb.); Khirni, lendwa (H.).

Habitat :—Sub-tropical Himalaya from Simla and Kumaon to Bhotan. Chittagong.

A moderate-sized, deciduous, glabrous, milky-juiced tree. Branches thick, soft, leafy toward the end. Leaves alternate, bright-green, toothed, ovate-lanceolate, 6-12in. Stalks 1-2in., bearing two large glands near top. Flowers small, yellow-green, appearing before the leaves, on thick, erect terminal. Solitary spikes, 3-10in. long, on different spikes. Male flowers in circular clusters, $\frac{1}{2}$ in. diam., central ones falling off and leaving their short stalks, outer ones sessile. Calyx

membranous, deeply 2-lipped; segments concave, rounded. Stamens 2; filaments very short, free. Anthers scarlet. Female flowers solitary, shortly stalked; spike thickened in fruit. Sepals 2-3, ovate, long-pointed; ovary globose, 3-celled. Styles 3, free, short, recurved. Capsule $\frac{1}{4}$ in. long, obscurely 3-lobed, fleshy when young. Seeds 3.

Use:—The whole tree is full of an acrid milk which, when applied to the skin, produces vesication. (Lisboa.)

1163. *Excoecaria Agallocha*, Linn., H.F.B.I., V. 472; Roxb. 713.

Vern.:—Gangwa, geor, uguru, geria (B.); Guna (Uriya; Geva (Bom.); Chilla, tella-chettu (Tel.); Haro (Kan.).

Habitat:—Tidal forests on all the coasts of India.

An evergreen, small tree. Bark grey, smooth, shining, with numerous, round, prominent lenticels. Wood very soft, spongy. Branchlets rather thick, marked with leaf scars, smooth. Leaves $2\frac{1}{2}$ - $3\frac{1}{2}$ in., alternate, oval, acute at base, shortly obtusely acuminate, obtuse, entire or obscurely crenate, rather thick; veins except midrib very inconspicuous. Petiole $\frac{3}{4}$ -lin., slender. Spikes androgynous; male flowers at the base of spikes. Filaments much lengthening after flowering. Styles free, nearly to the base. Male flowers:—sepals minute, unequal, sub-serrulate. Capsule $\frac{3}{4}$ in. diam., $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., very variable. (Trimen). Seeds glabrous, smooth. Flowers yellow, fragrant. Grows occasionally to 5 ft. in girth and 40 ft. in height.

Uses:—The milky juice, which exudes from the bark of this tree when green and fresh, is very acrid and injurious to the eyes, hence it is called "the blinding tree of India."

A decoction of the leaves is occasionally given by Hindu doctors in epilepsy, in the quantity of a quarter of a teacupful twice daily. This decoction is also used as an application to ulcers. (Ainslie.)

From the lower part of the trunk and roots, a soft, light, reddish suber is obtained, which is sold by the itinerant medicine men of Western India, under the name of *Tejbul*, as an aphrodisiacal tonic. (Pharmacogr. Ind. III. 315.)

In Fiji, it is employed for the cure of leprosy, its mode of application being very singular. The body of the patient is first rubbed with green leaves; he is then placed in a small room and bound hand and foot, when a small fire is made of pieces of the wood of this tree from which rises a thick smoke; the patient is suspended over this fire, and remains for some hours in the midst of the poisonous smoke and under the most agonizing torture, often fainting. When thoroughly smoked, he is removed, and the slime is scraped from his body; he is then scarified and left to await the result. In some cases he is cured, but frequently the patient dies under the ordeal. (Smith's Econ. Dic.)

1164. *E. acerifolia*, F. Didrichs, H.F.B.I., V. 473.

Vern.:—Basingh (Kumaon).

Habitat:—Western and Central Himalaya from Nepal to Kumaon. Khasia Mts.

A small evergreen tree, milky, glabrous; foliage deep-green. Leaves 3-6 by 1-2 in., alternate, membranous, elliptic, oblong-lanceolate, or oblanceolate, acuminate, serrulate or crenulate; nerves 8-10 pairs, strong beneath, arched, petiole $\frac{1}{4}$ - $\frac{1}{2}$ in., stout, eglandular. Spikes terminal and axillary, 1-2 in., slender, androgynous; bracts rounded or acuminate, broadly ovate, acute, entire, 2-3-fid. Male flowers:—sessile, 2-3 in.; the axil of a broadly ovate bract. Female flowers pedicelled, at the base of the spikes. Male sepals lanceolate, acuminate, entire; female sepals broadly ovate, acute, glandular at the base within; style stout, very short. Capsule about $\frac{2}{3}$ in. diam., 2-3-lobed; seeds smooth, globosely ovoid, mottled. (J. D. Hooker.)

Uses:—The Bhutias inhabiting East Kumaon use the leaves of this plant as a remedy for rheumatism. (Watt.)

1165. *Sebastiania Chamælea*, Mull-Arg., H.F. B.I., V. 475.

Vern.:—Bhui-Erandi (Concan).

Habitat:—Behar, Hazaribagh. Deccan Peninsula, from Bombay southwards; found in the open places and waste ground, common in the Tropics of the Old World generally.

An annual, glabrous herb, with the habit of an annual Euphorbia; 1-2ft. high, with numerous, prostrate or ascending, slender branches from the root. Leaves small, alternate, distant, $\frac{1}{2}$ -3in., by $\frac{1}{4}$ - $\frac{1}{2}$ in., nearly sessile, linear, acute at base, obtuse, apiculate, very minute, serrate, glabrous, often rather glaucous beneath. Stipules ovate, acute, ciliate. Flowers monœcious, yellowish, apetalous. Male very minute in short axillary or leaf-opposed spikes, female solitary at base of the male, or axillary. Male flower:—Calyx minute, 5-lobed, membranous, not covering the stamens in bud; stamens 1-4, filaments distinct. Pistillode 0. Female flower:—Sepals 3, longer than in male, obovate, acute, lacerate and ciliate, 2-glandular within; ovary much exserted, 3-celled, with 1 ovule in each cell, styles 3, small, not bifid. Fruit under $\frac{1}{4}$ in., glabrous, smooth, except for the two dorsal rows of spinules, thinly crustaceous, sub-globosely oblong. Seeds oblong, mottled. Endosperm fleshy; cotyledons broad. (Trimen and J. D. Hooker.)

Uses:—The juice of the plant in wine is used as an astringent; a *ghrita* of the plant is considered to be tonic, and is applied to the head in vertigo. (*Pharmacogr. Ind.* III. 316.)

N. O. URTICACEÆ.

1166. *Haloptela integrifolia*, Planch., H.F.B.I., v. 481.

Vern.:—Papri (H.); Vavala (Mar.), Aya (Tam.); Navili (Tel.); Rasbija (Can.).

Habitat:—Outer lower ranges of the Himalaya, from Jammu to Oudh, ascending to 2,000ft. From Banda and Bihar to Travancore.

A large, spreading deciduous tree. Bark $\frac{1}{2}$ in. thick, whitish-grey, exfoliating in long irregular flakes, soft, with an offensive smell when fresh, like the leaves and branchlets. Wood light,

yellowish-grey, moderately hard, no heartwood. Young shoots and inflorescence pubescent, otherwise mostly glabrous. Leaves elliptic, entire, those of the seedlings and coppice-shoots usually serrate; blade 3-5; petiole $\frac{1}{3}$ - $\frac{1}{2}$ in. long; secondary nerves 5-7 pair. Flowers in short lateral, often compound corymbs. Male and female flowers mixed; perianth cleft nearly to the base; segments 5, hairy. Male flowers:—Stamens 8; anthers hairy, no rudiment of ovary. Hermaphrodite flowers:—Stamens 5; ovary compressed, 1-celled, stalked; the stalk lengthening as the seed ripens, sometimes with the remains of the calyx at its base. Samara nearly orbicular, 1 inch diam., on a long slender or obliquely elliptic, glabrous or pubescent stalk. Wings membranous or chartaceous; tip 2-fid, lobes incurved.

Uses:—The tree has a mucilaginous bark, which is boiled, and the juice squeezed out and applied to rheumatic swellings, the exhausted bark is then powdered and applied over the parts covered by the sticky juice. (*Pharmacogr. Ind.* III. 318).

1167. *Celtis australis*, Linn., H.F.B.I., v. 482.

Vern.:—Batkar, brimdu, brimla, bigni, bingu, kharg, (Pb); Tughar (Pushtu).

Habitat:—The Salt Range and Temperate Himalaya from Murree to Nepal.

A middle-sized, deciduous tree. Bark bluish-grey, smooth, with horizontal wrinkles. Wood grey or yellowish-grey, with irregular streaks of dark colour, hard. Branchlets slender, pendulous; branchlets, petioles and young leaves glabrous or hairy. Leaves ovate to ovate-lanceolate, acuminate, base very oblique, sharply serrate, sometimes entire; blade 3-5; petiole $\frac{1}{2}$ in. long; the lateral basal nerves extending beyond the middle, but not to the tip of the leaf. Flowers with or before the leaves. Male flowers in axillary tufts, or racemed on short, leafless, axillary branchlets; pedicels capillary. Sepals oblong, obtuse, marginally woolly. Female or bi-sexual flowers rather larger than the male. Ovary ovoid, woolly at the base all over. Drupe very variable in size and shape; $\frac{1}{4}$ - $\frac{1}{2}$ in. long. (Brandis.)

Use.:—The fruit is given as a remedy in amenorrhœa and colic. (Stewart.)

1168. *Gironniera reticulata*, Thwaites, H.F.B.I., v. 486.

Vern.:—Koditani (Tam.) ; Khomanig (Nilgiri) ; Nára Kiyood (Ind. Bazars).

Habitat. Sikkim Himalaya, Assam ; Khasia Mts. ; Deccan Peninsula ; on the Ghats from S. Canara to Travancore.

An evergreen, lofty or small tree, 30-40ft. Branchlets slender, glabrous. Leaves entire or serrulate at the tip, coriaceous, penni-nerved ; secondary nerves 10-12 pair, impressed on the upper, and very prominent on the pair underside, 3-7in. Flowers dioecious. Male cymes shortly peduncled, branches short, many-fid. Male flowers rarely glabrous ; sepals 5, broad, obtuse, imbricate ; stamens 5, erect in bud ; pistillode woolly. Female flowers :—Sepals narrow, acute ; ovary sessile ; style central ; arms 2, filiform, ovate, pendulous. Drupe usually 2-keeled, about as long as the pedicel, $\frac{1}{2}$ - $\frac{3}{4}$ in. long ; endocarp hard ; embryo contorted.

Uses:—Thunberg says :—"The tree is called by the Dutch *Strunthont*, and by the Cingalese *Urenne*, on account of its disgusting odour, which resides especially in the thick stem and the larger branches. The smell of it so perfectly resembles that of human ordure, that one cannot perceive the smallest difference between them. When the tree is rasped, and the raspings are sprinkled with water, the stench is quite intolerable. It is nevertheless taken internally by the Cingalese as an efficacious remedy. When scraped fine and mixed with lemon juice, it is taken internally, as a purifier of the blood in itch and other cutaneous eruptions, the body being at the same time anointed with it externally." (Travels, Vol. IV. p. 234).

1169. *Humulus Lupulus*, Linn., H.F.B.I., v. 487.

Habitat:—Cultivated in N.-W. Himalaya.

A perennial, twining, scabrid herb. Rootstock stout branched ; stem tall, scabrid or prickly, with reversed bristles.

Leaves 3-4in. diam., petioled, cordate, toothed, upper ovate, lower 3-5-lobed. Bracts and bracteoles scarious, covered with resinous glands. Male flowers:— $\frac{1}{4}$ in. diam.; panicles 3-5in. across. Female flowers:—In heads, $\frac{1}{2}$ in. diam., yellow; styles purple; fruiting $1\frac{1}{2}$ in. diam.; scales orbicular.

Uses:—It is officinal in both the British and Indian Pharmacopœias.

1170. *Cannabis sativa*, Linn., H.F.B.I., v. 487; Roxb. 718.

Syn.:—*C. indica*, Lamk.

Eng.:—Indian hemp.

Sans.:—Ganja, vajradru, bhangah, vijayá.

Vern.:—Gánje-ká-pér, kinnab, bháng (H.); gánjá, bháng, siddhí (B.); Bhang, charas (Pb.); Bháng (Mar.); Gánja-ched, korkkar-muli, gánja-ilai, kalpam (Tam.); Ganjari-chettu, bangi-aku, kalpam-chettu, ganjah (Tel.); Tsjerucansjava, kancháva-chetti (Mal.).

Habitat:—Throughout India, wild in the N.-W. Himalaya, cultivated elsewhere.

A tall, erect, annual herb. Stem 4-8ft., Leaves alternate or the lower opposite, upper 1-3-lower 5-11-partite, serrate, palmati-nerved, 4-8in. diam. Stipules lateral. Flowers green, small, axillary, dioecious; males fascicled in short, pendulous panicles. Female flowers crowded under leafy convolute bracts. Male flowers:—Sepals 5, imbricate, stamens 5, erect in bud. Pistillode O. Female flowers:—Perianth hyaline, embracing the ovary or O. Ovary sessile; style central; arms 2, filiform, caducous; ovule pendulous. Achene compressed, crustaceous. Seed flattened, albumen unilateral, fleshy. Embryo curved, cotyledons broad, thick, sub-equal, radicle upcurved incumbent.

Uses:—Officinal in the Indian as well as British Pharmacopœias, and its uses are too well-known to be detailed here.

It should be used fresh. It deteriorates on keeping. Hence those imported from Europe not efficacious, and so, the necessity of making its preparations in India.

Hemp seeds yield from 25 to 30 per cent. of a light green or greenish-yellow oil becoming brownish-yellow on keeping. The specific gravity is

from '925 to '931; saponification value, 190 to 193; iodine value, 144 to 166; the fatty acids melt at 17° to 19°. It is used on the Continent as a paint oil and for making soft soap. (Hooper.)

The essential oil purified by distillation in a current of steam and extraction with ether, is a mobile liquid boiling at 248-268°; after repeated distillation from metallic sodium in order to remove as tearoptene, it yields a *sesquiterpene* $C_{15}H_{24}$, as a mobile, colourless oil of aromatic odour, which boils at 256°, and has a density of 0.897 at 15.3°, and is slightly levorotatory. This soon resinifies on exposure to air, and on adding concentrated sulphuric acid to its chloroform solution, the liquid becomes first green, then blue, and red on heating. "Cannabene" prepared from this essence by Personne, was a mixture. (J. Ch. S. LXVIII., pt. I (1895), p. 623.)

Charas, the natural exudation of the plant contains no chlorophyll. On analysis, it was found to contain 33 per cent. of an oil, having the formula $C_{13}H_{24}O_2$. As this compound gives rise to all the symptoms of cannabis poisoning, the main effects produced by the drug are due to the action of this.

The ethereal extract from charas has yielded four distinct chemical compounds:—

1. A terpene, boiling at 160-180°. Yield 1.5 per cent.
2. A sesquiterpene, boiling at 258-259°. Yield 2 per cent.
3. A paraffin ($C_{29}H_{60}$), m. p. 63-64°. Yield 0.15 per cent.
4. A toxic red oil, $C_{13}H_{24}O_2$, boiling at 265° under a pressure of 20 mm. Yield 33 per cent. of the charas taken. This is a mixture of at least two compounds having similar physical characters. One of these, of the formula $C_2H_{26}O_2$, has been isolated, and this has been named cannabinal.

The physiological action of the terpenes closely resembles that of the other members of this class, of which ordinary turpentine may be taken as the type. In doses of 0.5 gram, they have very little effect and produce none of the characteristic symptoms of cannabis action. The red oil, on the contrary, is extremely active, and taken in doses of 0.05 gram induces decided intoxication followed by sleep. The symptoms produced by it are peculiar to *Cannabis indica*, and as none of the other products appears to possess this action, this substance must be regarded as the active constituent of the plant. (J. Ch. S. 1896, T. 539 and 1899, T. 20.)

On the standardisation of preparations of Indian Hemp. In 1908, Mr. Hooper suggested a chemical method of valuing Indian hemp, and proposed that the iodine value of the resinous constituents containing cannabinal should be taken as a gauge of the activity. In the *British Medical Journal* for May 20th, 1911, p. 1176, Messrs. Marshall and Wigner have examined this method and shown that this method is of no value and could not be used as a substitute for physiological standardisation. According to them, the "acetyl number" should be used for determining the Standardisation. But in a report on the value of the "Acetyl number" by Messrs. Marshall and Wood published in the same journal for June 1, 1912, p. 1234, they came to the conclusion that the Acetyl number cannot be used as a substitute for physiological standardisation.

1171. *Streblus asper*, Lour., H.F.B.I., v. 489.

Syn.:—*Trophis aspera*, Retz., Roxb. 714.

Sans.:—Sákhotaka.

Vern.:—Siorá, karchanna, rusa, daheya (H.); Sheora, (B.); Hara saijung (Kol.); Sahra (Santal); Sahuda (Uriya); Nugnai (Magh); Karasni (Gond.); Jindi, dahya (Pb.); Karvati, karera, karaoli, karchanua, rusa (Bomb.); Prayám, palpirai (Tam.); Bariniki, bari venka, barranki, pakki (Tel.); Mitli, punje (Kan.).

Habitat:—Drier parts of India, from Rohilkhund, eastward and southward to Travancore, etc.

A small, evergreen, rigid, shrub or scraggy, gnarled tree, attaining 20ft. in height. Bark $\frac{1}{2}$ in. thick, soft, light-grey, irregularly ribbed. Wood white, moderately hard, no heart-wood, no annual rings. All parts full of milky juice. Branchlets many, tomentose or pubescent. Leaves elliptic or obovate, penni-nerved, irregularly dentate, rough on both sides, with minute, raised, round dots, blade 2-4in., petiole very short, about $\frac{1}{2}$ in. long, stipules obliquely lanceolate. Flowers dioecious. Male in globose heads; perianth campanulate, deeply 4-fid, pubescent outside; sepals 4, imbricate. Stamens 4, long, inflexed in bud. Females solitary, on axillary, usually fascicled peduncles, $\frac{1}{2}$ in. long, perianth yellow, of 4 decussate; closely imbricate sepals. Ovary straight, retuse; styles 2, filiform, connate at base. Ovule pendulous. Fruit a yellow, 1-seeded, pisiform berry, enclosed in enlarged, fleshy sepals. Seed globose; testa membranous; albumen 0; embryo globose; one cotyledon, very large, fleshy, enclosing the other, which is very small, and the upcurved radicle.

Uses:—The milky juice has astringent and antiseptic qualities, and is applied to sore heels and chapped hands. The bark in decoction is given in fevers, dysentery and diarrhoea. The roots are used as an application to unhealthy ulcers and sinuses. It is said to be an antidote to snake poison.

1172. *Morus indica*, Linn., H.F.B.I., v. 492.

Syn.:—*M. alba*, Var. *Indica*. Roxb. 658.

Sans.:—Shálmali, tula, tuda.

Vern.:—Tut, tutri (H.); Tut (B.); Nuni, bola (Assam); kimbu (Nepal); Mekrap, nambyong (Lepcha); Singtok (Bhutia); Tut, tutri, ambor, setur, tula ambor (Bomb.); Tut (M.); Shetur (Guz.); Kambili-púch; Mushu kattai (Tam.); Kambali, kambali-búchi (Tel.); Hippal-verali (Kan.).

Habitat:—Temperate and Sub-tropical Himalaya, from Kashmir to Sikkim; wild and cultivated (for silk-worm feeding) in Bengal, Assam, etc.

A moderate-sized, deciduous tree, with reddish or yellowish-brown, smooth bark, marked with long, horizontal lenticels. Leaves 2-5 by 1-3 in., ovate, caudate, acuminate, sharply serrate, often lobed, membranous, pubescent when young, scabrous when mature, 3-nerved at base; petiole $\frac{1}{2}$ -1 $\frac{1}{2}$ in., long, sparsely hairy. Flowers monœcious. Female spikes $\frac{1}{3}$ - $\frac{1}{2}$ in. long, ovoid; styles long, hairy. Fruiting spikes black when ripe. Peduncle $\frac{1}{10}$ - $\frac{1}{8}$ in. long, slender. Some consider this a more form of *M. alba*, with long points to the rougher leaves, connate styles and obovate sepals.

Uses:—The fruit has an agreeable, aromatic and acid flavor, is cooling and laxative, allays thirst, and is grateful in fevers.

The bark is supposed to be vermifuge and purgative.

The root is considered anthelmintic and astringent.

A decoction of the leaves is used as a gargle in inflammation and thickening of the vocal cords.

1173. *M. alba*, Linn., H.F.B.I., v. 492; Roxb. 658.

Sans.:—Tula.

Vern.:—Tút, túl, tulklu, chinni, chun (H.); Tut, chinni, satur, tutla, shah-tut (Bomb.); Uppu nute (Kan.).

Habitat:—Cultivated in the Punjab and N.-W. Himalaya.

A small or moderate-sized, deciduous tree, 30-40 ft. Bark brown, rather rough. Wood hard; sapwood white; heartwood yellow or yellowish-brown, darkening on exposure, young shoots, petioles and underside leaves along nerves, slightly pubescent. Leaves ovate-dentate, frequently lobed, acute; base often cordate, 2-3 in., sometimes larger, rather membranous; petiole $\frac{1}{2}$ -1 in.;

basal nerves 3-5. Flowers monœcious, the sexes often on distinct branches. Spikes short, under 2 inches. Perianth of male flowers:—Sepals hairy, elliptic. Sepals of females 4, the 2 inner flat or concave, the outer more or less keeled. Female spikes ovoid, pedunculate. Styles free, short. Fruiting spikes peduncled, white or red, sweet.

Use:—The sweet, deep-red juice of the white or red form of the fruit is used for sore-throat, and acts as a pleasant refrigerant in cases of fever. The fruit is employed, by *hakims*, as remedy for sorethroat, dyspepsia and melancholia. The bark is considered purgative and anthelmintic. (Punjab Products.)

The seeds, on extraction with ether, yield 33 per cent (A) and on pressing 24 p. c., (B) of a thick golden-yellow oil with a faint odour and a pleasant taste. It is very soluble in boiling 95 p. c. alcohol, soluble in an equal volume of absolute alcohol at 39°C. or of acetic acid at 41°C; easily soluble in all fat solvents.

1174. *M. nigra*, Linn., H.F.B.I., v. 492.

If specifically distinct, this plant, cultivated in Baluchistan, is allied to *M. alba*, Linn. The leaves are broader, firm, thick, 5-nerved, sub-sessile; sepals and styles densely hairy, purple. Fruit acidulous-sweet.

Uses:—It is used like the other species of this genus.

1175. *Ficus gibbosa*, Blume., H.F.B.I., v. 496.

Syn.:—*F. excelsa*, Vahl., Roxb. 641.

Sans.:—Udumbar.

Vern.:—Dâtir (Bomb.); Umbar (Guz. and Mar.); Koudajuvee; Tellabarin ka (Tel.).

Habitat:—Bases of the hill ranges throughout India from Kumaon eastwards to Burma and southwards to Ceylon.

A small or at times large tree, erect, often epiphytic or climbing, enclosing the trunk of trees in a perfect network of branches or creeping along the walls and on the sides of wells. "Bark thin, smooth, greenish-yellow. Wood light-brown or grey, soft to moderately hard, divided into alternate, broad, hard, dark, and narrow, light, soft, more or less wavy, concentric rings.

The light rings occasionally anastomose. Pores moderate-sized to large, scanty, irregularly distributed. Medullary rays moderately broad, light coloured, rather short, not numerous. (Gamble). Leaves thinly coriaceous (broad, rhomboid, says Gamble), often very unequal-sided, angular and with intra-marginal veins, the lowest pair of the base usually running near the edge, intermediate and tertiary distinct. Petiole $\frac{1}{3}$ - $\frac{1}{2}$ in.; stipules $\frac{1}{3}$ - $\frac{1}{2}$ in., ovate-lanceolate, convolute. Male sepals 4-6, linear, fleshy, hairy; stamens 1, filament short, united by its base to an abortive (insect attached) pistil. Gall flowers perianth of the male; ovary globose, smooth; style short, lateral. Female sepals 4, hyaline, linear, slightly hairy; achene slightly papillose, obliquely ovoid. Style lateral, elongate. Receptacles minutely hairy, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., peduncle up to $\frac{1}{3}$ in. long, bracts at base of the peduncles. Fruit yellow when ripe. A variable species.

Uses:—The decoction of the root acts as a powerful aperient. The root-bark is stomachic and gently aperient. The leaves are used to polish ivory and given to cattle, being supposed to increase the flow of milk.

1176. *F. bengalensis*, Linn., H.F.B.I., v. 499.

Syn.:—*Ficus indica*, Linn., Roxb. 639.

Sans.:—Vata.

Vern.:—Bor, ber, bargad (H.); Bot (B. and Ass.); Boi (Kol.); Boru (Ur.); Bare (Santal); Ranket (Garo); Borhar (Nep.); Kangji (Lep.); Bor, bohr (Pb.); Baagat, bar (Pushtu); Phagwari (Hazara); Wur, bur (Sind); War, vada (Mar.); Ala (Tam.); Mari, peddi mari (Tel.); Ahlada, (Kan.), Peralu, peralin (Mal).

Habitat:—Planted in all the plains of India; wild only in the Sub-Himalayan forests and on the lower slopes of the Deccan Hills.

A large or very large tree, branches spreading, sending down to the ground numerous aerial roots which afterwards become trunks. Bark $\frac{1}{2}$ in. thick, greyish-white, smooth, exfoliating in

small, irregular plates. Wood grey, moderately hard ; no heart-wood, having narrow, wavy, concentric bands of soft tissue and darker colour. Pores moderate-sized and large, sometimes very large, often sub-divided, scanty, scattered irregularly. Medullary rays fine, equi-distant, but not numerous. On a radial section the pores and soft bands are distinctly marked, giving the wood a characteristic grain, but larger pores being frequently oblique. (Gamble). Young shoots pubescent. Leaves glabrous when mature, approximate near the ends of branches, ovate, mostly obtuse ; base cordate or rounded ; basal nerves 3-5 ; the midrib with 4-6 pair of secondary nerves ; blade 4-8 in. ; petiole 1-2 in. Fruit globose, pubescent, $\frac{1}{2}$ - $\frac{1}{3}$ in. diam., sessile, scarlet when ripe, supported by 2-4 broad, obtuse bracts.

Uses :—The milky juice is externally applied for pains and bruises and in rheumatism and lumbago. It is considered as a valuable application to the soles of the feet when cracked or inflamed, and is also applied to the teeth and gums as a remedy for tooth-ache.

An infusion of the bark is supposed to be a powerful tonic and is considered to have specific properties in the treatment of diabetes. The seeds are deemed cooling and tonic. The leaves are applied, heated as a poultice, to abscesses, and after they have turned yellow are given with roasted rice in decoction as a diaphoretic. The root fibres are given in gonorrhœa in the Punjab, being considered by Vaidis to resemble Sarsaparilla. An infusion of the small branches is useful in hæmoptysis. The tender ends of the hanging roots are given for obstinate vomiting.

(1) Composition of a dried specimen of *Ficus bengalensis* (from Perawa)—

Water	...	...	...	...	11.4
Albuminoids	...	...	...	...	7.1
Oil	...	...	...	...	4.0
Carbohydrates	...	...	...	...	35.2
Fibre	...	...	...	...	36.8
Ash	...	...	...	...	5.5

100.0

(2) A sample of the fresh fruit was gathered in Calcutta.

As the sample was very wet, it was partially dried for analysis. It then contained :

Water	...	...	...	...	12.9
Albuminoids *	...	...	...	...	8.1
Oil	...	...	...	...	6.1
Carbohydrates †	...	...	...	...	35.5
Fibre	...	...	...	...	31.0
Ash ‡	...	...	...	...	6.4

The alcoholic extract contains a glucoside, a trace of acid, but no appreciable quantities of tannin or alkaloid. The colouring matter is precipitated from its deep purple alkaline solution as a reddish brown deposit which dries to an almost black powder.

1177. *F. Benjamina*, Linn., H.F.B.I., v. 508.

Syn. :—*F. comosa*, Roxb. 644

Vern. :—Sunonijar (Santal); Juripakri Assam, Chittagong (Nepal); Kunhip (Lepcha); Pimpri (Bomb.); Jili (Chutia Nagpur); Pútra-janvi (Tel.)

Habitat :—Base of the Eastern Himalaya, Assam, and the Deccan Peninsula.

A very large, evergreen tree, with drooping branches. Wood soft, light-brown, in alternate layers of light-brown, soft tissue and darker (light on a vertical section) hard tissue, the breadth of the soft layers about half that of the hard ones. Pores moderate-sized to large, very scanty, evenly distributed. Medullary rays fine to moderately broad, rather numerous, uniform. A fine, avenue tree, and excellent for shade. (Gamble.) The tree is 50-60ft. in height; it has 12-20ft., clear stem; and 6-8ft. girth. (Kurz.)

An evergreen tree, with a dense, divaricate crown and pendulous branches, all parts glabrous; stipules small, lanceolate, glabrous; leaves ovate to elliptically ovate on a slender petiole, 5-8in. long, obtuse at the base, rather long and bluish,

* Containing nitrogen	...	...	...	1.31 per cent.
† Ditto colouring matter	...	...	...	7.7
† { Ditto silica (Si O ₂).	...	...	...	0.35
† { Ditto phosphoric acid (P ₂ O ₅)	...	...	...	0.53

acuminate, 2-3½ in. long, rigidly chartaceous, entire, glabrous; the nerves thin, much crowded and uniting near the margin, all parallel with a transverse net venation between, prominent on both sides; receptacles sessile by pair or solitary in the axils of the leaves, globular or almost obovate and narrowed at the base, varying in size from ½ to ¾ in. in diameter, blood-red when fully ripe, glabrous, 3-bracted, the lateral bracts broad, but short, rounded, glabrous. Male flower, very few scattered, pedicelled; sepals 2, large, flat; anther subsessile. Gall flower, mostly pedicelled; sepals 3 or 4, long, spathulate, ovary ovoid, smooth. Female flower sessile; Sepals shortly spathulate, achene ovoid-reniform, longer than the style, stigma large.

Uses:—A decoction of the leaves mixed with oil is believed in Malabar to be a good application to ulcers. (Drury.)

1178. *F. retusa*, Linn., H.F.B.I., v. 511.

Syn.:—*F. Benamina*, Willd., Roxb. 643.

Vern.:—Kamrup, Zir (H. B.); Butisa (Kol.); Sunumjon (Santal); Jili (Chutia Nagpur); Jamu (Nepal); Sitnyok (Lepcha); Nandruk (Mar.); Yerrajuvi, nandireka (Tel.); Pilála, pinval (Kan.)

Habitat:—Base of the Eastern Himalaya, Khasia Hills, Assam and the Deccan Peninsula.

A large, evergreen umbrageous, tree, often epiphytic, aerial roots slender, quite glabrous. "Bark brown, fairly smooth. Wood light, reddish-grey, moderately hard, with narrow, wavy bands of soft tissue, alternating with broader bands of firm texture. Pores moderate-sized, often sub-divided, scanty. Medullary rays short, moderately broad." (Gamble). Leaves elliptic, ovate or obovate, apex rounded, or shortly and bluntly acuminate; blade 2-4 inches, narrowed into petiole, ¼-½ in. Male flowers numerous, scattered, sessile, or short-pedicelled; sepals 3, sub-spathulate; stamen single; anther cordate, apiculate, as long as the filaments. Gall flowers sessile or pedicelled; sepals 3, broadly spathulate; ovary smooth. Female flowers sessile, much smaller than in the gall; styles of both short;

stigma cylindric or clavate. Receptacles finely pubescent while young. Fruit sessile, yellow or reddish; $\frac{1}{2}$ in. diam.; basal broadly ovate, obtuse, spreading.

Uses:—The bark of the root, the root itself, and the leaves boiled in oil form good applications for wounds and bruises. (Rheede.)

In rheumatic headache, the leaves and bark pounded are applied as a poultice. In flatulent colic, the following prescription is used in the Concan:—Take of Nándruk leaf juice, Tulsi leaf juice, and *ghi* equal parts; boil until all the water has evaporated; do this again 21 times with fresh quantities of the juice of the two plants; the residuum may then be applied to the belly, and fomentation with hot brick be practised. The juice of the bark has a reputation in liver disease; dose 1 tola in milk. (Dymock.)

1179. *F. Rumphii*, Blume, H.F.B.I., v. 512.

Vern.:—Kabar, gajna, pípul, gajún, pipal, gagjaira, pakar, khabar (Hind.); Gaiaswát (Beng.); Suman-pípar (Kol.); Sunamjor (Santal); Pakri (Assam); Sat-bur (Cachar); Pakar (Nepal); Prab (Garó); Kabai pipal (Kumaon); Pulákh, rúmbal, badha, palák, pilkhan (Pb.); Parás, pípal (Raj.); Pair, páyar, asht (ashta), (Mar.); Kabai pipal, ganjar, suman, pipar (Lohardugga); Nyung byu (Burm.)

Habitat:—On the dry lower slopes of the mountains of the Punjab; and the Northern, Western and Central India, Assam.

A large, deciduous tree, often epiphytic, all parts glabrous. "Bark smooth, grey, $\frac{1}{2}$ in. thick. Wood very soft, spongy, with alternating bands of loose and firm tissue of equal width. Pores oval, scanty, moderate-sized. Medullary rays fine, uniform, equidistant." (Gamble.) Leaves sub-coriaceous, upper surface minutely tuberculate when dry, shining, long-petiolate, broadly ovate, with acuminate apex; edges entire, sub-undulate; base broad, but slightly narrowed towards the petiole; basal nerves 5, rarely 7 (2 being minute); lateral primary nerves 3-6 pair, rather irregular, prominent only in the young state;

length of blade 4-6in. of which the acuminate apex forms only about one ; petioles 2·5 to 3·5in. Stipules ovate-lanceolate, from $\frac{1}{2}$ to 1in. long ; receptacles sessile, in pair in axils of leaves or of leaf scars, globular, smooth when young, whitish with dark spots, when ripe nearly black ; 5in. across ; basal bracts 3, rotund, small. Male flowers few, and only near mouth of the receptacle, the perianth of 3 spathulate pieces, anther single, on a filament about as long as itself ; gall and female flowers with perianth of 3 lanceolate pieces ; the gall ovary, smooth and usually ovoid ; achene minutely tubercled, mucilaginous ; style in both elongate, stigma clavate. (King.)

Uses :—The Santals use the fruit as a drug. The juice is used in the Concan to kill worms and is given internally with turmeric, pepper and *ghi*, in pills, the size of a pea, for the relief of asthma ; it causes vomiting. The juice is also burned in a closed vessel, with the flowers of *mudar* and 4 *gunjas* weight of the ashes mixed with honey, is given for the same purpose. (Dymock.)

1180. *F. religiosa*, Linn., H.F.B.I., v. 513 ; Roxb. 642.

Sans. :—Aswaththam.

Vern. :—Pipal (H.) ; Ashathwa, (B.) ; Hesar, pīpar (Kol.) ; Hesak (Santal) ; Jāri (Uriya) ; Bor-bur (Kachar) ; Pipli (Nepal) ; Ali (Gond.) ; Pipri (Korku) ; Pipal, bor (Pb.) ; Pimpala (Mar.) ; Pipul (Guz.) ; Arasa ; Aswartham (Tam.) ; Rai, raiga, ragi, rāvi or kulla rāvi (Tel.) ; Rangī, basri, arali, arle, haspath, rāgi, asvalta (Kan.)

Habitat :—Wild in the Sub-Himalayan forests, in Bengal and in Central India.

A large, glabrous, usually epiphytic tree. Bark grey, nearly $\frac{1}{2}$ in. thick, exfoliating in rounded, irregular flakes of varying size, often leaving rounded depressions. Wood greyish-white, moderately hard ; having narrow bands of soft tissue, which alternate with broader bands of firmer substance. Pores moderate-sized and large, often sub-divided, rather scanty.

Medullary rays uniform and equidistant, moderately broad. (Gamble). Leaves coriaceous, upper surface shining, lower minutely tuberculate when dry, long-petiolate, ovate-rotund, narrowed upwards and the apex produced into a linear lanceolate tail, edges entire, undulate; base broad, rounded to truncate, sometimes a little narrowed at the union with the petiole occasionally emarginate or in young leaves, very cordate, from 5 to 7-nerved; lateral primary nerves about 8 pairs, reticulations five, distinct; length of blade from 4.5 to 7 in. of which the apical tail forms about a third, breadth 3 to 4.5 in. petioles from 3-4 in., long, slender. Stipules minute, ovate, acute; receptacles in pair, axillary sessile, smooth, depressed, spheroidal, when ripe dark-purple, 5 in. across, with 3 broad, spreading, coriaceous basal bracts. Male flowers very few and only near the mouth of some receptacle (absent in many), sessile; the perianth of 3 broadly ovate pieces, anther single, ovate-rotund, its filament short. Gall and fertile flowers:—sessile or pedicillate; the perianth of 5 lanceolate pieces; style short, lateral; stigma rounded, the galls much more numerous than the fertile females, and many of them without perianth.

Uses:—The bark is astringent, used in gonorrhœa. It has also maturative properties. The fruit is laxative and helps digestion. The seeds are said to be cooling and alterative. The leaves and young shoots are used as a purgative, and an infusion of the bark is given internally in scabies. (Ainslie and Wight.) A paste of the powdered bark is used as an absorbent in inflammatory swellings. (Dr. Emerson.) According to Bartolomeo (Voyage to the East Indies) the dried fruit “pulverized and taken in water for a fortnight, removes asthma and produces fruitfulness in women.” Water in which the freshly-burnt bark has been steeped is said to cure cases of obstinate hiccup. (Dr. Thornton.) In cracked foot the juice is employed. (Asst.-Surg. T. N. Ghose.) The powder of the dried bark is used in fistula in ano. I have seen a *Hakim* use it with benefit in the following way: he introduced a metallic tube, something like a blow pipe, into the fistula, and putting a small quantity of the powder into it, blew the same into the fistula. (Asst.-Surg. Nobin Ch. Dutt Watt's Dic.)

A dried specimen from Bundi was analysed and found to contain—

Water	...	...	...	...	9.9
Albuminoids *	...	...	...	...	7.9
Oil	...	...	...	...	5.3
Carbohydrates †	...	...	...	...	54.9
Fibre	...	...	...	...	33.7
Ash ‡	...	...	...	...	8.3
					<hr/> 100.0 <hr/>

The alcoholic extract contains a soluble tannin which gives a green precipitate with ferric chloride.

The colouring matter appears to be identical with that characteristic of the other varieties of *Ficus*.—(Agricul. Ledger 1904—No. 4).

1181. *F. infectoria*, Roxb., H.F.B.I., V. 515 ;
Roxb. 643.

Sans. :—Plaksha ; Parkati.

Vern. :—Pilkhan, kahimal, ramanjir, pákar, kaol, kaim, Pipli, (H.) ; Pákar (B.) ; Baswesa (Kol.) ; Prab (Garo) ; Safed-kabra (Nep.) ; Kangji (Lep.) ; Pepre (Kurku) ; Serelli (Gond.) ; War, batbar, janglipipli, palákh, pákhar, pilkin, trimbal (Pb.) ; Killah (Konkan) ; Pepar, gándhaum bara, dhedhumbara, lendva (Mar.) ; Pepri (Guz.) ; Jooi, kall-alun, pepre, kurku (Tam.) ; Jewi, yuri, bassari (Tel.) ; Kari, bassari (Kan.).

Habitat :—Plains and lower hills of India, from the Salt Range to Sikkim ; Bengal ; Assam ; both Peninsulas.

A large, widely spreading, deciduous, fast-growing tree, usually epiphytic. Bark $\frac{1}{2}$ in. thick, greenish-grey, smooth, exfoliating irregularly in flakes and patches. Wood grey, moderately hard ; with narrow concentric bands of soft tissue alternating with broader bands of firm texture. Pores large, scanty, often sub-divided. Medullary rays uniform, moderately broad, equidistant. (Gamble.) Young shoots and stipules minutely hairy. Leaves thinly coriaceous, glabrous, shining, ovate or ovate-oblong, shortly acuminate, margin undulate, base acute, rounded or cordate, blade 3-6 in., petiole 1-3 in.

* Containing nitrogen	...	...	...	...	1.27 per cent.
† Ditto colouring matter	...	...	...	...	7.5
‡ { Ditto silica (Si O ₂)	...	...	...	...	1.85
‡ { Ditto phosphoric acid (P ₂ O ₅)	...	...	...	...	0.69

long, secondary nerves 8-10 pair, the lowest pair from the base. Fruit sessile or shortly peduncled, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam., basal bracts minute.

Uses:—The bark of this, along with the barks of other four species of *Ficus* and of *Melia azadirachta*, pass by the name of *Panchavalkala* (or the five barks); they are used in combination. A decoction is much employed as a gargle in salivation, as a wash for ulcers, and as an injection in leucorrhœa. (Watt.)

1182. *F. heterophylla*, Linn., H.F.B.I., v. 518, Roxb. 637, 638.

Sans.:—Trayamáná.

Vern.:—Gaori-shiora, balábahulá, balálálá ghoti-suara, bhuidúmúr, ballam dúmúr (B.); Pakhur (H.); Datri (Mar); Buroni (Tel.); Valli-teragam (Mal.).

Habitat:—Throughout the hotter parts of India, near water, from the Gangetic Plain eastwards and southwards to Perak and Ceylon.

A shrub sometimes creeping on the ground or over rocks, with short, pubescent stem and branches, the leaves very variable, scabrid. Leaves petiolate, membranous; general outline usually more or less ovate-elliptic, but varying from elongate-lanceolate to ovate or ovate-round, often irregularly 3 to many-lobed, with the apex more or less acuminate, the edges irregularly and coarsely dentate or dentate-repand; the base blunt, rounded, or cordate, 3-to-5 nerved; both surfaces scabrous, and covered with short, stiff hairs; lateral nerves from 4-8 pair according to the length of the leaf (in the much-lobed leaves the nervation is palmate); length of blade 2 to 4 in., petioles varying from 5 to 2.5 in.; stipules 2 to each leaf scarious, ovate, glabrous or nearly so, 3 to 4 in. long. Receptacles on peduncles of varying length, solitary, axillary, spherial to elongated-pyriform, always with a more or less prominent mammillate umbilicus which is but imperfectly closed by bracts, more or less hispid, scabrid, and sometimes verrucose when young; when ripe nearly smooth, dark-orange, 4 to 1 in. long; basal bracts minute, triangular, glabrous (in the much elongated forms appearing

to rise from below the base of the receptacle) ; peduncle proper from 4 to 1 in. long. Male flowers with 3 or 4 cleft gamophyllous perianth and a single stamen. Gall flowers with a perianth like the males ; the ovary ovoid, smooth, with a short, lateral style. Fertile female flowers with gamophyllous 4-cleft perianth, the achene sub-globular, minutely tuberculate, with a hyaline, viscid, external coat, style long, lateral stigma cylindric.

This is a polymorphic species, and often presents great variety in foliage even in the same plant. (King.)

Uses :—The juice of the root of this shrub is internally administered in colic pains, and the juice of the leaves mixed with milk in dysentery. The bark of the root, which is very bitter, pulverised and mixed with coriander seed, is considered a good remedy in coughs and asthma and similar affections of the chest. (Rheede.)

1183. *F. asperrisma*, Roxb., H.F.B.I., V. 522 ; Roxb. 644.

Vern. : —Kâl-ambar (Guj.) ; Kharwat (Mar.) ; Karakarbudâ (Tel.) ; Khargas (Kan.) ; Irumbaruthan (Tam.)

Habitat :—Central India and the Deccan Peninsula.

A shrub or tree, all young parts very scabrous. Leaves collected about extremities of branches, alternate, petiolate, oblong-lanceolate to ovate or obovate or elliptic ; the apex blunt or acuminate ; the edges subentire, serrate, dentate or crenate in the upper three-fourths, and entire towards the rounded or blunt ; 3-nerved, primary nerves 3-5 pair, very prominent and hispid on lower surface, as are the reticulations ; the rest of the lower surface scabrid-hispid ; upper surface pretty uniformly and strongly scabrous, shortly hispid. Blade 1½-5 in. long, petiole ½-1 in. long, stout, stipules minute. Receptacles pedunculate, often reflexed, scabrous-hispid, globular, slightly depressed at apex, with rather prominent umbilicus. Umbilical scales erect. Male flowers numerous in part of receptacles ; perianth of 4-5 linear-lanceolate, scabrid pieces. Stamen 1. Ovary of gall-flowers ovate, lanceolate, with thick terminal style and dilated stigma ; the perianth like that of male flowers. Fertile female flowers : —with perianth of 6-7 linear-lanceolate, smooth pieces.

Achene elongated, obovoid, minutely tubercular. Style lateral, filiform, stigma obovate.

Uses:—The juice and bark are in Bombay well-known remedies for glandular enlargements of the abdomen, such as liver and spleen. (Dymock.)

1184. *F. hispida*, Linn., H.F.B.I., v. 522.

Syn.:—*F. oppositifolia*, Willd., Roxb., 647.

Sans.:—Kák dumbar.

Vern.:—Kagsha, gobla, totmila, kat-gularia, konea-dumbar Katumbri Rambal, dumbar, Bhudoi (Hind.); Dumar, kak-dumar (Beng.); Kotang, sosokera (Kol.); Sita pordóh (Santal); Khoskadumar (Ass.); Shakab (Garó); Koreh (Kurku); Kharwa (Nep.); Taksot (Lepcha); Poksha (Michi); Maiu-lok (Magh); Katumer, bomair (Gond); Dadúri, degar, rúmbal (Pb.); Dhe daumaro, jangali anjir (Guz.); Dhedumera Kharawat (Mar.); Pe-attis (Tam.); Bodamamadi, brahma-médi, bummarri, korasana (Tel.); Adavi-atti (Kan.); Pe-yatti paraka (Mal.).

Habitat:—Throughout India, from the Punjab in the N. W. to Malacca and Ceylon.

A moderate-sized tree. Bark $\frac{1}{2}$ in. thick, grey, peeling off in irregular flakes, with slight, horizontal ribs encircling the tree. Wood soft, dirty-grey, in regular concentric bands of soft tissue which alternate with firmer bands of equal width and darker colour. Pores scanty, moderate-sized, often oval and sub-divided. Medullary rays moderately broad and fine, prominent as long, narrow bands on a radial section. (Gamble.)

The tree is quick of growth, recognized easily by its opposite leaves. All parts more or less hispid pubescent, the branches and, in Malayan specimens, the upper surfaces or the leaves sometimes glabrescent when old. Leaves opposite, usually, says King; petiole membranous, ovate, ovate-oblong or elliptic to sub-ovate-elliptic, apiculate or abruptly acuminate, edges dentate or entire in old leaves, base rounded, emarginate, slightly

cordate or narrowed and subcuneate; 3-5-nerved; primary lateral nerves 3-5 pairs; secondary nerves rather straight; reticulations fine; the lower surface hispid-pubescent, the upper hispid-scabrid; length 4-9in. (in young shoots as much as 12in.); petioles from $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long (in young shoots often 3-3 $\frac{1}{2}$ in.) densely hispid-pubescent; stipules 2 to each leaf, ovate-lanceolate, pubescent externally, glabrous internally; about $\frac{1}{2}$ in. long, often in shoots of four on the receptacles bearing leafless branches. Receptacles shortly pedunculate, turbinate, ovoid, or sub-pyriform, slightly umbonate, hispid and sometimes with bracts scattered along their sides; yellowish when ripe and from $\frac{1}{2}$ -lin. across; umbilicus rather large; basal bracts 3, borne on peduncles, $\frac{1}{2}$ - $\frac{3}{8}$ in. long, in pair from the axils of the leaves, or in fascicles from shortened tuberculate branches from the old wood, or in pair or fascicles on elongate, stipular, bracteate, sometimes leafy, branches issuing from the larger branches of the stem, and often reaching to or even penetrating the soil. Male flowers rather numerous near the apex of the receptacles containing the galls; the perianth of 3 concave hyaline pieces; stamen 1; the anther broad, filament short; gall flowers pedicillate with no obvious perianth; the ovary smooth, globular; style short, sub-terminal; stigma dilated. Fertile female flowers like the galls as regards perianth; the achene ovoid; the styel long, lateral hairy; the stigma cylindric tubular.

Uses:—According to Sanskrit writers the figs of this plant promote the secretion of milk. They are also supposed to preserve the foetus in the womb. (U. C. Dutt.) The acrid milk is used medicinally in Kangra. In Bombay and the Concan, the powdered fruit heated with water to form a poultice is applied to buboes. It is also given to milch cattle to dry up their milk. (Dymock.)

According to the report of Mr. Moodeen Sheriff, the fruit, seeds and bark are possessed of valuable emetic properties. The most eligible form of administration appears to be the seeds of the ripe fruit, dried and preserved from moisture in stoppered bottles. The dose is about one drachm, which in effect is equal to four or six of the ripe fruit. The emetic

action of the bark is generally attended with more or less purging. The dose is placed at from forty to sixty grains. The bark, in doses of from fifteen to thirty grains, three or four times daily, is stated to act effectually as an antiperiodic, and in half those quantities as a good tonic. (Ph. Ind.).

1185. *F. Cunia*, Ham., H.F.B.I., v. 523. Roxb. 646.

Vern.:—Khewnau, Kunia, khurhur, kassa, ghui (H.); Dumbur, jagya-dumur (B.); Riu, aiu (Kol.); Porok podha Horpodo (Santal); Kanhya (Nepal); Sangji (Lepcha); Kanai, palkai taikran (Michi); Kathgular, trumbal, karndol, kuri (Pb.); Porodumer, Kharwar. (Mar.)

Habitat:—Sub-Himalayan forests, from the Chenab to Bhotan; Central India, Assam, the Khasia Mts. and Chittagong.

A small or moderate-sized tree, usually evergreen branchlets, young shoots and midrib pubescent. "Bark thick, reddish-brown, rough; wood rough, moderately hard, greyish-brown with narrow, concentric bands which alternate with broader bands of firmer texture. Pores scanty, moderate-sized. Medullary rays fine, equidistant." (Gamble). Leaves alternate, entire or serrate, rough above, more or less pubescent beneath, semicordate, the lower half of the base large rounded, shape and size very variable; blade 8-16; petiole $\frac{1}{2}$ - $\frac{2}{3}$ in.; stipules $\frac{3}{4}$ -1 in. long, base broad, scar, annular. Receptacle $\frac{1}{2}$ in. diam., in pair or clusters on long, leafless, scaly branches, from the trunk near the base of the ripening underground. Male sepals 3. Gall and female sepals about 4, lanceolate, gamophyllous. Ovary of galls, globose, smooth; style very short, lateral. Achenes broadly ovate, emarginate on one side, tubercled, viscid; style very long, lateral; stigma large, bifid. Recognized at once by the long leaves with unequal semi-sagittate base.

Uses:—The fruit is given in aphthous complaints. A bath made from the fruit and bark is a cure for leprosy. (Rheede.) The juice from the roots is given in bladder complaints and, boiled in milk, in visceral obstructions. (Revd. A. Campbell.)

A dried specimen submitted by the Deputy Conservator of Forests, Angu Division, shewed the following composition :—

Water	...	...	...	...	13.5
Albuminoids *	...	...	...	...	8.7
Oil	...	...	...	...	5.7
Carbohydrates †	...	...	...	...	43.1
Fibre	...	...	...	...	1.77
Ash ‡	...	...	...	...	11.3
					100.0

(Agricul. Ledger 1904—No. 4).

1186. *F. Ribes*, *Reinw.*, H.F.B.I., v. 524.

Syn. :—*F. policarpa*, Roxb. 645.

Vern. :—Chhotá-junglí-anjír (H); Chiria-pé-atti (Tam); Chinna-verri-atti-pandu (Tel.); Cheriya-kât-tatti (Mal.)

Habitat :—Tenasserim to Penang and Singapore.

A small tree, the young branches sparsely strigose, slightly swollen at the insertion of the leaves. Leaves alternate, petiolate, membranous, lanceolate or oblanceolate; the edges entire; lateral primary nerves 7 to 9 pairs, not prominent, both sides glabrous, except the lower which, on the midrib, and larger nerves, is appressed, pubescent; length of blade 2.5 to 4.5 in., petioles strigose, $\frac{1}{2}$ in. long; stipule linear-lanceolate, convolute, $\frac{3}{4}$ in. long. Receptacles rising from elongated, ramous, leafless, (sometimes stipulate towards the apex), glabrous branches which issue from the stem near the ground, pedunculate, sub-globose, strongly ribbed when young, verrucose, pubescent, about $\frac{1}{8}$ in. across when ripe; umbilicus closed by 5 broad scales; the base constricted into a stalk about $\frac{1}{10}$ in. long, at the junction of which with the peduncle are 3 small bracts; peduncle proper $\frac{1}{2}$ in. long. Male flowers numerous, the perianth of 2 large, inflated, roundish pieces, anther single, almost sessile, very broad. Gall flowers mostly sessile, without perianth, the ovary broad, obliquely obovoid, sub-rhomboid, with terminal thick style. Fertile female flowers on separate receptacles, mostly pedicellate; the

* Containing nitrogen	...	...	...	1.40 per cent.
† Ditto colouring matter	...	...	...	9.0
‡ { Ditto silica (Si O ₂)	...	...	...	1.65
{ Ditto phosphoric acid (P ₂ O ₅)	...	...	...	1.12

perianth tubular, short, covering only the pedicel of the rhomboid minutely tuberculate achene. Style much longer than the achene; stigma cylindric or clavate.

Uses.—It possesses, according to the experience of Mr. Moodeen Sheriff, all the medicinal properties of the preceding *F. hispida*. It is desirable to know more of the properties of these trees. (Ph. Ind.)

1187. *F. palmata*, Forsk., H.F.B.I., v. 530.

Syn.:—*F. carica*, Linn. Roxb. 636.

Vern.:—Gúlar, khabára, anjiri, beru, bedu (H.); Phagwara, kák, kok, phedú, inzar, phag, kirmi, phagoru, fágú, phog, khabáre, phegra, thapur, jamir, dhúrú, dhudi, daholia (Pb.); Phagwara (Pushtu); Anjir, inzar (Afg.); Kembri (Raj.); Dhoura (C. P.); Pepri (Guz.); Fagwara, Thapur (Plains of Upper India).

Habitat:—N.-W. India, from the Indus eastwards to Oudh, ascending to 3,000ft. in the Himalaya, Mt. Aboo.

A bush or moderate-sized tree. Shoots tomentose, pubescent or glabrous. Bark grey, smooth. Wood white, close and even-grained, moderately hard, with wavy crescentic bands of soft tissue, alternating with bands of equal width of firmer tissue. Pores very small and moderate-sized, often oval and sub-divided. Medullary rays fine and moderately broad; unequally distributed. (Gamble.) Branches solid, with a large pith; branchlets, petioles and underside of leaf soft-tomentose. Leaves rough above, broad-ovate, dentate, at times deeply lobed; base truncate or cordate, sometimes abruptly narrowed to the petiole; blade 3-5, petiole 1-2in. long; 3-5 basal nerves; secondary nerves on midrib 3-6 pairs. Stipules in pairs, ovate, acute, pubescent, deciduous. Receptacles axillary, more or less pear-shaped, umbonate, $\frac{1}{2}$ -1in. diam.; usually pubescent, yellow when ripe, edible; basal bracts deciduous 3, acute, at the base of the stalk which often lengthen out to $\frac{1}{2}$ in. as the fruit ripens, peduncle $\frac{1}{2}$ -1in. Perianth ciliate with long hairs. Male flowers on hairy pedicels, sepals 4-5, lanceolate, hairy. Gall flowers, sessile or pedicelled; perianth deeply 5-cleft; ovary

ovoid, smooth; style very short, lateral stigma dilated. Female flowers, perianth of gall flowers; achene trigonous, granular; style sub-terminal, long, hairy; stigma bifid. The Indian representative of *F. carica*, Linn. (J. D. Hooker.)

Uses :—The fruits contain chiefly sugar and mucilage, and accordingly act as a demulcent and laxative. They are principally used as diet in cases of constipation and in diseases of the lungs and bladder. They are also used as poultices. (*Punjab Products*.)

1188. *F. glomerata*, Roxb., H.F.B.I., v. 535; Roxb. 646.

Syn. :—*F. racemosa*, Wall.

Vern. :—Gúlar paroa, lelka, umar, umrái, tue, dimeri (H.); Yajna dumbar (B.); Loá (Kol.); Dumer (Chutia Nagpur); Dimeri (Uriya); Dumri (Nepal); Tchongtay (Lepcha); Thoja (Gond.); Alawa (Kurku); Kathgúlar, krumbal, rumbal, batbar, palák, kakammal, dadhuri (Pb.); Ormul (Pushtu); Umbar gúlar (C. P.); Umbar (Bomb.); Umbara, atti, rumadi (Mar.); Umbar (Guz.); Atti (Tam.); Moydi, atti, badda, paidi, mari, medi (Tel.); Kulla-kith, atti (the gum is called *Chandarasa*) (Kan.)

Habitat :—Outer Himalaya and plains and low hills of India, from Rajputana and Salt Range to the Khasia Mts, Burma and the Deccan Peninsula.

A large, erect, deciduous tree up to 60 ft. high. Bark $\frac{1}{2}$ in. thick, smooth, reddish-brown, with a few large cracks. Wood grey or greyish-brown, soft with broad, light-coloured bands of loose tissue, alternating with narrower, interrupted, darker bands of firmer texture. Pores large and very large, sub-divided. Medullary rays moderately broad and fine, bent where they touch the pores. (Gamble.) Shoots glabrous or pubescent. Leaves 4-7 in., tapering to the point, entire, base obtuse, rarely acute, 3-nerved; petiole 1-2 in.; stipules $\frac{1}{2}$ -1 in., ovate, lanceolate, pubescent. Receptacles 1 $\frac{1}{4}$ in. diam., reddish; umbilicus depressed; base of young much contracted; basal bracts 3. Male flowers near the mouth of the receptacle, sessile; sepals 3-4,

membranous inflated, gall and female flower intermixed; perianth toothed; gall ovary, ovoid, rough. Achene granulate; stigma clavate. (J. D. Hooker.)

Uses:—The leaves, bark and fruit are employed in native medicine. The bark is given as an astringent and as a wash for wounds. It is also employed to remove the poison from wounds made by a tiger or cat. The root is useful in dysentery, and a fluid obtained from it by incision is administered as a powerful tonic. The leaves reduced to powder and mixed with honey are given in bilious affections. The small blister-like galls common on the leaves, soaked in milk and mixed with honey are given to prevent pitting in small-pox. (Atkinson.) The figs are considered astringent, stomachic and carminative, and are given in menorrhagia and hæmoptysis. The milky juice is administered in piles and diarrhoea, and in combination with sesamum oil in cancer. The fresh juice of the ripe fruit is used as an adjunct to a metallic preparation which is given in diabetes and other urinary diseases. In Bombay, the sap is a popular remedy, which is locally applied to mumps and other inflammatory glandular enlargements, and is given in doses of four tolás with cumin and sugar for gonorrhœa. (Dymock.) The bark is given to cattle when suffering from rinder-pest. It is ground with onions, cumin, and cocoanut spathes and mixed with vinegar. (Coimbatore Dist. Man.) The sap of the root is used in diabetes. (T. R. Moodeliar.) An infusion of the bark is much employed by the Tamil-speaking people for menorrhagia. (Dr. Thomas in Watt's Dic.)

Chem. on analysis it was found to contain:

Water ...	...	...	...	13.6
Albuminoids*	...	...	...	7.4
Oil...	...	...	...	5.6
Carbohydrates†	...	...	...	49.0
Fibre ...	...	...	...	17.9
Ash‡ ...	...	...	...	6.5

The alcoholic extract contains a trace of soluble tannin which gives a light-green precipitate with ferric chloride.—(Agricul. Ledger, 1904—No. 4.)

* Containing nitrogen ...	...	...	...	1.19 per cent.
† Ditto colouring matter	...	...	...	8.5
‡ { Ditto silica	...	...	...	0.25
‡ { Ditto phosphoric acid	...	...	...	0.91

1189. *Antiaris toxicaria*, Leschen, H.F.B.I., v. 537.

Vern:—Chándla, chándkuda, charvár mádá, karvat or kharvat (Bomb. and Mar.); Karwat (Konkan); Alli, netávil, nettá-vil maram (Tam.); Jazngri, Agganpatte, Jaguri (Kan.); Araya-angely, nettá-vil. (Mal.)

English:—The Upas tree.

Habitat:—The Deccan Peninsula, on the ghats, from the Concan southwards. According to Beddome, it is the largest tree of the Western forests attaining a height of 250ft.

A gigantic, ever-green tree, attaining 250ft. Trunk often buttressed. Bark thick, grey. Wood white, soft, even-grained; young shoots, petioles and midrib velvety. Leaves glabrous or hairy beneath, 4-8in. glossy, elliptic, acuminate, entire or serrulate; base rounded or cordate, young lanceolate, serrulate. Petiole $\frac{1}{4}$ in. Flowers menæcious. Males crowded on the surface of the pedunculate and usually fascicled receptacles, which are supported by imbricating bracts; sepals 3-4; stamens 3-8. Females solitary, enclosed in a pear-shaped involucre of numerous confluent bracts; perianth 0; ovary aduate to the involucre. Fruit like a small fig, purple scarlet or crimson; pyriform velvety, fleshy, $\frac{3}{4}$ in. diam., "Male-receptacles 3-4, together, orbicular; and peduncles velvety, $\frac{1}{2}$ in. diam." (J. D. Hooker.)

Uses:—The juice of the tree is the source of the fabulous *Upas* poison. The poison at first acts as a purgative and emetic, then as a narcotic causing death by violent fits of tetanic convulsions.

In the Concan and in Canara, the bitter seeds are used as a febrifuge, and in dysentery, one-third to one-half of a seed being given three times a day.

Antiarin, the most important constituent of the milky juice of *Antiaris toxicaria*, has the formula, $C_{27}H_{42}O_{10} + 4H_2O$, and antiarose, $C_6H_{12}O_5$, a sugar metamerie with rhamnose.

1190. *Artocarpus hirsuta*, Lamk., H.F.B.I., v. 541.

Vern:—Ranphanas, Pat-phanas (Mar.). Ayni, Anjalli (Tam.).

Habitat:—Evergreen forests of the Western ghâts, from the Concan southwards.

A tall ever-green tree, attaining 200ft. Wood moderately hard; sapwood white; heart wood yellowish-brown, durable, seasons well. Pores large, sometimes subdivided, often filled with a white substance. Medullary rays fine to moderately broad, wavy very distinct, but distant, bent where they meet the pores (Gamble.) Young shoots, petioles, peduncles, stipules, midribs, and main nerves appressedly hispid with long tawny hairs. Leaves 6-9 by 4-6in., broadly ovate or elliptic (rarely obovate), subacute, coriaceous, entire, smooth, and when adult glabrous except on the midrib and nerves beneath, slightly narrowed to the base; main nerves about 10 pairs, prominent beneath; petioles stout, $\frac{1}{2}$ - $\frac{3}{8}$ in. long; stipules nearly lin. long, lanceolate. Flowers on axillary pedunculate receptacles; the male receptacles narrowly cylindric, at first erect or ascending, afterwards pendulous, 4-6in. long and about $\frac{1}{4}$ in. in diam.; the female receptacles erect, $4\frac{1}{2}$ by $3\frac{1}{2}$ in. MALE FLOWERS: Sepals 2, united below. Stamen 1; anther exserted, ovate. Receptacle scales (bracteoles) chaffy, not peltate. FEMALE FLOWERS: Perianth tubular, confluent below with the receptacle. Fruit size of a lemon, echinate, the spines (free apices of anthocarps) about $\frac{1}{4}$ in. long, cylindric, straight, hispid, perforate at the apex for the filiform style, edible. Seeds $\frac{1}{2}$ - $\frac{3}{4}$ in. long, ovoid. (Cooke.)

Uses:—The dry leaves and juice together with Zedory and Camphor are applied to buboes and swelled testicles. (Rheede.)

The dried juice breaks with a resinous fracture, is only partly soluble in alcohol, wholly soluble in benzol and petroleum ether. (Pharmacogr. Ind. III. 355.)

1191. *A. integrifolia*, Linn., H.F.B.I., v. 541.

Sans.:—Panasa.

Vern.:—Kánthál (B. and Ass.); Kathal, chakki, panasa, panas (H.); Kanthar (Santal); Poros (Kol.); Panasa (Uriya); Phanas (Mar. and Bomb.); Pilá, pilápazham (Tam.); Panasa-pandu, pansa, véru-panasa (Tel.); Halsu, heb-helsu, halsina (Kan.); Teprong (Garo).

Eng.:—The Jack-fruit tree.

Habitat :—Deccan Peninsula, native of the forests of the Western ghats ; cultivated throughout the hotter parts of India.

A large, ever-green, glabrous tree, attaining 60ft. Wood moderately hard ; sapwood pale, heart-wood bright-yellow, darkening on exposure ; very durable, seasons well. Bark thick, blackish, deeply cleft when old, yielding a gum. The juice is used as bird lime. Youngest shoots and midrib with soft, stiff hairs (Brandis.) Leaves 4-8in., thickly coriaceous, dark-green, elliptic-oblong or ovate, acuminate, entire or 3-lobed ; base acute, rather rough beneath ; leaves of young plants often lobed ; nerves 7-8 pair. Petiole $\frac{1}{2}$ -lin., rather slender ; stipules large spathaceous, lanceolate, glabrous. Flower-heads embraced by spathaceous deciduous stipular sheaths, axillary and terminal, often 2-nate. Peduncles $\frac{3}{4}$ in., at first slender. Male cylindric, 2-6in., by 1-2in., diam ; bractioles 0 sepals 2, oblong or spathulate ; tips pubescent. Fruit 12-30 by 6-12in., in young trees on large branches in old trees hanging on short stalks from the main stem or branches through conical protruberance of the rind, oblong or cylindric, tubercled, *i.e.*, with flattish, rarely acute, tips of the pyramidal antho-carps. Seeds oily, numerous, an inch long, oblong. Testa thin, coriaceous, surrounded by a luxious pulp, which latter forms the staple food of the natives. Pulp is eaten cooked or uncooked when ripe, and preserved dry in flat pan-cakes. Seeds eaten boiled or roasted.

Uses :—The juice of the plant is applied externally to glandular swellings and abscesses to promote suppuration. The tublers, if worn on the waist, are said to cure hydrocele. The young leaves are used in skin diseases, and the root is used internally in diarrhœa.

The leaves considered an antidote to snake-poison. (T. N. Mukerji.) The unripe fruit is astringent, the ripe laxative, but rather difficult to digest, although very nutritious.

The dye stuff jackwood contains, in addition to morin, cyanomaclurin $C_{15}H_{12}O_6$ or $C_{13}H_{10}O_7$. It possesses the characteristic property that its alkaline solution on warming develops a deep indigo blue colouration. It was noticed that in certain important respects its properties were similar to those of catechin, the colourless crystalline constituent of gambier catechu,

whose composition is $C_{15}H_{14}O_6$. The analytical results given by these substances were nearly identical.—J. Ch. S. 1905 T. p. 717.

1192. *A. Lakoocha*, Roxb., H.F.B.I., v. 543; Roxb. 634.

Sans.:—Lakucha.

Vern.:—Tiun, tinu dheu, daheo, (Pb.); Dahu dhan, barhal, lakûch, dhâvâ (H.); Láhu (Bomb. and Duk.); Votamba (M.); Vonte (Kan.); Dháo (Kumaon); Dephal, dahu, dehua, lakúcha, mádár (B.); Dahu (Santal; Kol.); Dewa, chama, chamba (Ass.); Dawa (Cachar); Barrár (Nepal); Kamma régu; Lakuchamu nakka-rénu (Tel.).

Habitat:—Tropical Himalaya, from Kumaon eastwards to Burma, and southwards to Travancore.

A large, deciduous tree. Bark dark coloured rough. Wood hard, sapwood large, white and soft; heartwood yellow, hard, shining, mottled. Branchlets densely grey or rusty tomentose. Leaves ovate or obovate, $3\frac{1}{2}$ -12 in. by 2-6 in., shortly finely acuminate or cuspidate at apex, truncate or sub-cordate at base; margins entire, sometimes serrate or subundulate in young leaves, coriaceous, glabrous, shining above, densely grey-downy beneath; lateral nerves 8-12 pair, prominent and with a fine, distinct reticulation between beneath. Petioles $\frac{1}{2}$ -1 in. long. Stipules small, pubescent, caducous. Flowers in shortly pedunculate or sub-sessile, axillary, globose heads, $\frac{1}{2}$ -1 in. diam.; bractioles peltate. Male flowers:—sepals on sub-sessile receptacles, 3-4, triangular, truncate, pubescent, 2-3, says Trimen. Stamen 1; filaments broad at base, tapering upward. Anther exserted, broad, 2-celled. Female flowers on shortly peduncled receptacles. Anthocarps flat, smooth, at apices, completely united. Fruit oblong, irregularly globose, 2-3 in. diam., minutely velvety, yellow when ripe, edible. Seeds oblong, 1 in. thick, flat.

Use:—In Bengal, one or two seeds or a small quantity of the milk is popular as a purge. (Dymock.) Fruit eaten raw or dried and pickled. (Talbot.) In the Ratnagiri District and Bombay, it is curried, as well as pickled. (K. R. Kirtikar.)

1193. *Laportea crenulata*, Gaud., H.F.B.I., V. 550.

Vern.:—Chorpatta; Surat (B.); Utigun ka bij (Behar); Moringi (Nepal); Sir-nat (Assam); Mealum-ma, sunkrong (Lepcha).

Habitat:—Tropical Himalaya, from Sikkim eastwards, Assam, the Khasia Mts., and southwards to Perak; the Concan.

A large, evergreen shrub, 8-10ft., or a small tree. Wood very soft, separating when dry into concentric, long, fibrous layers. Cystolith cells conspicuous in the epidermis. Branchlets, petioles and inflorescence armed with stinging hairs of two kinds, minute and long. Branches stout, terete, green. Leaves 9-10in. long, largest, 16 by 12in., ovate or elliptic, crenulate in the upper part or nearly entire; petiole 1-4in. long, with a few long hairs, otherwise glabrous, round, raised, cystolith cells prominent on both surfaces. Stipules ovate, lanceolate. Flowers minute, green, dioecious, in axillary, paniced cymes, longer than petiole, dichotomously branched. Flower clusters remote, often unilateral. Male perianth deeply 4-partite. Female sub-campanulate; lobes acute. Achenes oblique, $\frac{1}{4}$ in. diam., seated on the cup-shaped perianth, and crowned by the style. This is the worst of the stinging nettles of India, says Gamble. The effects last for many days, says Brandis.

Use:—In Patna, the seeds in doses of $\frac{1}{2}$ dram to $\frac{1}{2}$ ounce, are used in the same way as coriander. (Irvine.)

N. O. PLATANACEÆ.

1194. *Platanus orientalis*, Linn., H.F.B.I., V. 594.

Vern.:—Buin, búná, chanár (Pb.); Chintar, chinar (Pushtu).

Habitat:—Cultivated in the N.-W Himalaya, from the Sutlej westwards.

A large, deciduous tree. Bark $\frac{1}{4}$ in. thick, smooth, light or dark-grey peeling off in thin scales. Wood white, hard, with a faint tinge of yellow or red. Buds densely clothed with long hairs. Branchlets and young leaves with soft, deciduous, tawny

or ferruginous tomentum. Branches very spreading. Leaves 6-9in. diam., usually broader than long-alternate palmy-nerved glabrous when mature, deeply 3-5-nerved; base cuncate, truncate or cordate at the insertion of the petiole. Lobes irregularly toothed or lobulate. Petiole 1-3in., says Brandis, 3-5in., (Kanjilal.) Stipules large, deciduous on shoots, leafy and lobed. Flowers monœcious, in unisexual, usually sessile, globose heads, 1-1½in. diam., 2-5in., long; axillary peduncles 4-6in., long, male and female heads sometimes on the same peduncles. Sepals 3-6, petals as many, all extremely minute scale-like, often more or less confluent, formerly regarded as bracteoles. Male stamens as many as sepals, each consisting of a long almost sessile anther, the 2 cells parallel, adnate to a cuneate, connective with a truncate top. Female Ovaries hairy, at base, as many as sepals, surrounded by staminodes, narrowed into a long, subulate style, ovule 1, pendulous. Fruiting head 1-1½in. diam., consisting of numerous 1-seeded achenes, densely clothed at base, with long fine hairs, the broad apex narrowed gradually into the persistent long style.

Uses:—The fresh leaves bruised and applied to the eyes in cases of ophthalmia, the bark boiled in vinegar is given in diarrhœa, dysentery, hernia and toothache. (Honigberger.)

N. O. JUGLANCEÆ.

1195. *Juglans regia*, Linn., H.F.B.I., v. 595.
Roxb. Fl. Ind. III. 631.

Sans:—Akshota ákschóda, ákhóda, ákhóta.

Vern.:—Akhrót, (H. and B.) Tagashing (Bhutia); Kabsing (Ass.); Kowal (Lep.); Akhor, krot dún (Kash.); Akhrót, dún, chármag., than thán, khór, ká, darga, akhóri, krot, ka-botang, starga, ughz, magz, thanka, [bark=dindása] (Pb.); Ughz, magz (Afg.); Akróda (Mar.); Akhrot (Guz.); Akróttu (Tam.); Akrótu (Tel.); Akródu (Kan.); Jouz (Arab.); Girdagán, chár-maghz (Pers.).

Habitat:—Temperate Himalaya, from Kashmir eastwards. Khasia Hills.

A large, deciduous, aromatic tree, very nearly glabrous; young shoots tomentose. Bark grey, characteristically marked by deep, vertical, parallel fissures, $\frac{1}{2}$ in. to 2 in. thick. Wood moderately brown, with darker streaks, often beautifully mottled. (Gamble.) Leaves imparipinnate, 6-12 in., alternate. Leaflets 5-13 or 7-9, odd one the larger, stalked, side ones opposite, sessile ovate-oblong, 3-8 in., pointed, entire. Flowers green, male and female on the same tree, appearing with the leaves. Male flowers numerous, in pendulous, lateral catkins, 2-5 in., long, on the previous year's wood above the leaf scars, often two superposed. Perianth narrow, nearly flat, irregularly 5-lobed, combined with the branch, the free tip of which appears on the underside. Stamens 15-20, nearly sessile. Female flowers 1-3, clustered, sessile, on the ends of branches; the bracts combined in a pubescent, ovoid involucre aduate to the ovary, its narrow mouth obscurely 4-toothed; perianth of 4 linear lanceolate lobes inserted on the mouth of the involucre, alternate with its teeth. Ovary 1-celled; ovule 1. Style arms 2, short, broad, recurved, roughly wrinkled. Drupe ovoid, 2 in. long, the green, thick, fleshy rind enclosing a woody wrinkled 2-valved nut; the edible part consisting of the large, corrugated, 4-lobed cotyledons of the single seed. (Collett.)

Uses:—The bark is used as an anthelmintic and detergent; the leaves are astringent and tonic, in decoction are supposed to be specific in strumous sores, and to be anthelmintic; the fruit is also believed to have an alterative effect in rheumatism.

The kernels afford by expression about 50 per cent. of a clear sweet oil, largely used in the hills for culinary purposes and illumination. Stewart states that a large proportion of the oil is prepared by simply bruising the kernel between stones. The oil-cake is a good cattle-food. Walnut oil has a yellow or orange-yellow colour with a slight odour of linseed and a nutty flavour. Practical experiments show it to be a strong drying oil. Crossley and Le Sueur (1898) testing a sample expressed in India found it to have constants agreeing well with those previously recorded: Specific gravity at 15.5°, 0.9259; acid value, 10.07; saponification value, 192.5; iodine value, 143.1; Reichert Meissl value, 0.00; insoluble fatty acids, 95.44 per cent. (Agricultural Ledger 1911-'12, No. 5, p. 166).

N. O. MYRICACEÆ.

1196. *Myrica Nagi*, Thunb., H.F.B.I., v. 597.

Syn :—*Myrica sapida*, Wall. *M. integrifolia*, Roxb. 765.

Sans :—Katphala, kaidaryama.

Vern :—Kaiphāl (B., H., Sind. Pb. and M.); Ding solir (Khasia); Kobusi (Nep.); Kari-phāl (Gaz.); Maru dampattai (Tam.); Kaidaryamu (Tel.).

Habitat :—Sub-tropical Himalaya, from the Ravi eastwards. The Khasia Mts., Sylhet and southwards to Singapore.

A small, aromatic, nearly glabrous, evergreen tree. Leaves crowded towards ends of branches, lanceolate, 3-5in., acute or obtuse, entire, the lower pale or rust-coloured, minutely gland-dotted, aromatic. Stalks short, pubescent; the leaves of the young shoots sometimes 5-8in., and toothed. Bark grey, a brownish-grey, roughly with deep vertical wrinkles. Wood purplish-grey, hard, close-grained, apt to warp. Flowers minute, uni-sexual, glandular, the male and female on different trees. Male flowers in catkins, $\frac{1}{4}$ -1in., long, solitary in the leaf axils or sessile on common, drooping, axillary stalk, 1-3in. long; bracts orbicular, often with 2-3 smaller ones. Perianth none. Stamens 3-6, filaments free except at the bases. Female flowers in axillary, erect spikes, $\frac{1}{4}$ -1in. long; bracts 2-4; perianth none; ovary 1-celled; style-arms 2, long, incurved, red. Drupe sessile, scaly, ovoid, $\frac{1}{4}$ - $\frac{3}{4}$ in., flesh red; stone wrinkled and pitted. (Collett.)

A very commonly cultivated tree in China and Japan, and is much esteemed for its sub-acid fruits, which are eaten by natives and Europeans both raw and cooked. I can find no difference between it and the *M. integrifolia* of Roxb.**

Myrica integrifolia is a very common native bush or tree in the mountainous parts of Bengal and the eastern peninsula of India, and especially in Silhet, where it is called Sophee, and the fruit is eaten both pickled and raw." (Hooker in Curtis' Bot. Mag. for Sept. 1, 1868.)

Uses :—The bark is described by writers on Sanskrit medicine as heating, stimulant, and useful in diseases supposed to be caused by deranged phlegm, such as catarrhal fever, cough, and affections of the throat. It enters into the composition of numerous formulæ for these diseases, in which it is combined with other stimulants and alteratives. The powdered bark is

occasionally used as a snuff in catarrh with headache. (U. C. Dutt.) It is also used by Hindus at the present day, mixed with ginger, as a rubefacient application in cholera, &c., and according to Irvine, *kaiphal* and ginger mixed, is the best substance that can be employed for this purpose. Dymock writes, "Muhammadan writers tell us that the bark is resolvent, astringent, carminative and tonic; that it cures catarrh and headaches; with cinnamon they prescribe it for chronic cough, fever, piles, &c. Compounded with vinegar, it strengthens the gums and cures toothache; an oil prepared from it is dropped into the ears in earache. A decoction is a valuable remedy in asthma, diarrhoea, and diuresis; powdered or in the form of lotion, the bark is applied to putrid sores: pessaries made of it promote uterine action. The usual dose for internal administration is about 60 grains. *Dahn-el-kandul*, an oil prepared from the flowers, is said to have much the same properties as the bark."

The ground bark yields a coloring principle, named *Myricetin*. The yield of coloring matter from 100 grams of bark averaged from 0.23 to 0.27 gram. Its formula is $C_{15}H_{10}O_8$. Its points of similarities to, and differences from, other coloring principles are given in the following table:—

	Chromium.	Aluminium.	Tin.
1. { Myricetin ...	Red brown ...	Brown-orange ...	Bright red-orange.
Fisetin ...	Ditto ...	Brown-orange, inclin- ing to red.	Slightly less red.
Quercetin ...	Ditto ...	Brown-orange, inclin- ing to yellow.	Bright orange.
2. Morin ...	Olive-yellow ...	Dull yellow ...	Bright yellow.
3. { Gentisin ...	Green-yellow, dull and pale.	Bright yellow tint, very pale, scarcely dyed.	Cream colour, scarcely dyed.
Euxanthone ...	Dull-brown, yet yellow.	Bright yellow, pale.	Bright yellow tint, very pale, scarcely dyed.

Analysis of the bark:—

Tannin matters absorbed by hide	...	...	27.3
Soluble non-tanning substances	...	...	7.9
Fibre and insoluble matters	...	...	52.3
Moisture	...	...	12.5

100.0

N. O. CASURINEÆ.

1197. *Casuarina equisetifolia*, Forst., H.F.B.I., v. 598.

Syn.:—*C. muricata*, Roxb. 623.

Vern.:—Jangli saro, janglijháú, Viláyati saro (H.); Ján (B.); Jurijur, muj-jun (Sind); Sarpúbala, sarova, suru (Mar.); Chouk, shavuku-maram, shavuku-pattay (Tam.); Serva, chavuku-mánu, chavuku-patta (Tel.); Kásrike (Mysore); Sura (Kan.); Aru, chavaka-maram (Mal.).

Habitat:—On the east side of the Bay of Bengal from Chittagong southwards, cultivated elsewhere in India. Introduced into the plains as a roadside tree, and from its resemblance to the *Tamarix* received the vernacular names of this plant.

The tree is very useful in the reclamation of land near the sea, and is much valued in the Madras and Bombay Presidencies for planting on sand-dunes along the coasts of Coromandel and N. Kanara.

A large, evergreen tree, tall, straight-stemmed. Bark brown, rough, fibrous, peeling off in vertical strips. Wood reddish-brown, very hard, cracks and splits. The ends of branches thickly set with numerous, long, slender branchlets, which are mostly deciduous and fulfil the function of leaves. Branchlets jointed, the internodes $\frac{1}{8}$ - $\frac{1}{4}$ in. long, 6-8-ribbed, with fine hairs at the bottom of the furrows between the ribs and stomata in the furrows only. The ribs of each joint terminate upwards in the teeth of a membranous sheath, alternating with the ribs of the next joint above. Opposite these teeth are axillary vegetative buds, of which, as a rule, only one or few grow out into branchlets. These axillary buds mostly develop at the ends of branchlets where the joints have not yet lengthened out. Here the teeth of the annular sheaths are much longer (up to $\frac{1}{4}$ in.) than on the lower and older joints, and they are densely clothed with fine hairs. Flowers uni-sexual. Males monandrous, axillary, under the teeth of the annular sheaths of terminal, short jointed, cylindric spikes 1 in., long. Perianth of 2 large scales enclosing the anthers and 2 smaller at right angles to the first, anthers

oblong, 4-celled; filament short. Females in small ovoid spikes at the ends of lateral branchlets, consisting of very short joints, one flower under each tooth of the annular sheath. Perianth of 2 large scales enclosing the ovary, which, as the seed ripens, grow out into 2 large woody valves, more or less hairy, supported before maturity by the tooth of the sheath. Ovary 1-celled, with 2 pendulous; ovules, only one of which develops into a seed. Style short, dividing into 2 long filiform, garnet-coloured branches. Fruit a woody, globose cone, $\frac{3}{4}$ in. diam.; testa aduate to the walls of the achene, which terminates in a long membranous wing. Albumen 0; embryo straight, radicle superior; cotyledons flat. The tree is monœcious the male and female flowers are sometimes, found on the same branch, but (as often happens with monœcious trees) some trees habitually bear male and other female flowers only. (Brandis).

This is one of the most interesting plants in the vegetable kingdom as regards its morphological peculiarities as well described by Brandis.

Uses:—The bark, according to Dr. Gibson, is an excellent and often readily available astringent in the treatment of chronic diarrhoea and dysentery. In infusion it is employed as a tonic.

N. O. CUPULIFERÆ.

1198. *Betula utilis*, Don *Prod.*, H.F.B.I., v. 599.

Syn.:—*Betula Bhojpatra*, Wall.

Sans.:—*Bhurjapatra*.

Vern.:—*Bhejpattra* (H.); *Burj*, *Burzal*, *bhuj phurz* (Pb.); *Shák* or *shág*, *pad*, *phatak*, *takpa* (Ladak, Lahoul, Piti, and Kanawar); *Phuspat* (Nepal); *Bhurjpatra*, *bhojpatra* (Bomb., Cutch and Guzerat).

Habitat:—Temperate Himalaya, from Kashmir to Sikkim and Bhotan.

A moderate-sized, deciduous tree, often gregarious, 40-50 feet or even 60ft., or shrub at high altitudes. Bark smooth, shining, reddish-white or white, with white, horizontally oblong lenticels,

the outer bark consisting of distinct, thin, papery layers, peeling off in broad, horizontal rolls. In these layers, the lenticels appear as pink, elongated, oblong patches. Wood white, with pinkish tinge, tough, even-grained, moderately hard. (Gamble). Youngest shoots and leaves pubescent. Pith oblong. Leaves 2-3 in. ovate, acuminate, irregularly serrate, glandular beneath, slightly hairy along midrib and nerves, which latter are in 8-12 pair. Petiole $\frac{1}{2}$ - $\frac{3}{4}$ in. Bracts of male spikes ciliate, stipulate; anther-cells glabrous, save with a few hair at the tips. Female spikes solitary, stout; bracts pubescent, 1-2 in. by $\frac{1}{2}$ - $\frac{1}{3}$ in. diam. Nuts with a narrow wing; bracts in fruit coriaceous, deeply, 3-lobed, broader than the wings of the nut.

Uses:—The decoction of the bark is used as a wash in otorrhœa and poisoned wounds. (U. C. Dutt) The infusion of the bark is used as a carminative; it is prescribed also in hysteria. It has also certain aromatic and antiseptic properties.

1199. *Quercus incana*, Roxb., H.F.B.I., v. 603; Roxb. 674.

Vern.:—Banj, ban or bán (Kumaon); Sila supári (Kashmir); Bán, ban, rin, rinj, vari, banj, máru, kharshu, shindar, kharpata serei, daghun-bán (Pb.)

Habitat:—Temperate Himalaya; from the Salt Range and Murree to East Nepal.

An evergreen tree, attaining 50-80 ft., and trunk 4-12 ft. in girth; bark dark-grey, rough with cracks and fissures. Leaves 3-6 by 1-2 in., oblong or ovate-oblong or ovate-lanceolate, acuminate, mucronate-serrate, tough and coriaceous, young pinkish and woolly all over, mature dark-green and glabrous above, densely white or grey, rarely brownish, tomentose beneath; lateral nerves 12-20 pairs, straight, parallel; base acute; petiole $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Male spikes slender, drooping, 2-4 in. long, often much interrupted; perianth 4-5-lobed; anthers glabrous. Female flowers axillary, sessile, solitary or clustered on current year's shoots; styles linear-clavate, spreading. Acorn generally solitary, usually on current year's shoots; cup at first enclosing the nut, glabrate, rough, woody;

nut $\frac{3}{4}$ in. long, conico-ovoid, canescent, brown when ripe. (Kanjilal.)

Uses:—The acorns form the medicine known in the Punjab bazars as *balût*. They are given as a diuretic in gonorrhœa, and also as an astringent in indigestion, diarrhœa especially of children, and in asthma. Before being administered, they are usually buried in the earth to remove their bitter principle, then washed and lastly ground; dose 3 *māshās*. (Stewart.)

1200. *Q. lamellosa*, Smith, H.F.B.I., v. 606.

Vern.:—Shalshi, pharat-singhali, budgrat (Nepal); Búk (Lepcha).

Habitat:—Eastern Himalaya; from Nepal to Bhotan, the Nāga and Dāphla Hills, Manipur.

A very large, evergreen tree; wood very hard and heavy. Buds silky, young shoots with tawny, deciduous pubescence. Leaves elongate-elliptic, acute at both ends, sharply serrate to near the base, upper side glabrous, underside glaucous, with deciduous pubescence while young; blade 8-18, petiole 1-2 in long, secondary nerves 18-25 pairs, straight, impressed on the upper, very prominent on the under-side. Flowers sessile on short spikes; peduncles thick; cup very large, up to 3 in. across, woody, with 10 thin, broad, loose lamellæ, enclosing the greater part of the nut. (Brandis.)

Use:—The bark and acorns are used in medicine. (Watt.)

1201. *Q. pachyphylla*, Kurz, H.F.B.I., v. 608.

Vern.:—Bara katus, Sungre katus (Nepal); Hlosiri, Kashok (Lepcha).

Habitat:—Sikkim; Manipur.

A large ever-green tree, leaves elliptic-lanceolate, long-acuminate, glabrous above, underside pale, with minute stellate hairs; mid-rib and nerves glabrous; blade 5-8, petiole $\frac{3}{4}$ in.; secondary nerves 8-10 pairs, impressed above, arching and anastomosing under the margin; spikes sometimes androgynous. Cups $1\frac{1}{2}$ -2 in. across, always confluent, forming large, irregularly shaped masses, more than half the nut enclosed in the cup. Nuts glabrous, shining, nearly globose. (Brandis.)

Use:—In Sikkim the bark and acorns are used medicinally as astringents. (Watt.)

1202. *Corylus Colurna*, Linn., H.F.B.I., v. 625.

Vern.:—Urni (Jhelum); Winri, wiri, warawi, wúriya, thangi, thankoli (Kashmir and Chamba); Jangi (Chenab); Shurli, sharoli, ban pálu, geh, ban dilla (Sutlej); Kapási, bhotia badám (Kumaon); Shirol (Garwhal); Jhangi (Kangra).

Habitat:—Western Temperate Himalaya from Kashmir to Kumaon.

A moderate, rigid, gregarious tree, 40-50ft. high. Bark thin, dark. The scales of the bark often detaching themselves at the base and exfoliating upwards. Wood pinkish-white, moderately hard. Leaf-buds short, rounded in hoary, ovate scales. Leaves 3-6in. long, glabrous when mature, rather membranous, ovate or obovate, shortly acuminate; base cordate, unequally or doubly serrate, often slightly lobed, 5-8 by 2½-6in. Lateral nerves 10-12 pair, straight, generally pubescent beneath, each terminating in a long tooth. Petiole 1-1½in. glandular-pubescent. Stipules ¾in. long, lanceolate, hairy. Flowers monoecious. Male flowers one in each bract; perianth 0. Stamens usually 4, filaments forked, separating the anther-cells. Spikes fasciated, 1-2in. long, cylindrical, drooping. Female flowers in pairs in the upper bracts of a small, many-bracteate bud-like spike. Perianth superior. Ovary 2-celled, 2-ovuled. Nuts 1-seeded. ½-1in. long; somewhat compressed, hard, deep-brown, 2-3 together in a ribbed, coriaceous, double-involucre. (Kanjilal).

Uses:—The nuts are not uncommon in drug-seller's shops, being considered tonic. (Watt.)

N. O. SALICINEÆ.

1203. *Salix tetrasperma*, Roxb., H.F.B.I., v. 626; Roxb. 712.

Sans.:—Búrum.

Vern.:—Bed, bent, baishi, bet (H.); Nachol (Kol.); Gada,

Sigrik (Santal); Bhesh (Garó); Bhi (Assam); Pani jama (Beng.); Laila, bainsnj (N.-W. India); Bis, bitsa, bakshel (Pb.); Yir (Kashmir); Válunj, bachá (Dec.); Atrupalai (Tam.); Etipála (Tel.); Atrapala (Mal.); Momakha (Burm.); Niranjí (Kan.); Sufaida, badha (Sindh); Wullunj, bacha (Bombay); Boch, bach (M.); Dhanie (C. P.)

Habitat:—Throughout tropical and Sub-tropical India, from the Punjab eastwards to Mishmi, Assam and Munnipore and southwards to Travancore.

A moderate-sized, deciduous tree, 20-40ft. Bark rough, with deep, vertical, rough fissures. Wood red, soft, porous, even-grained. Flowering after leafing; trunk stout, attaining 10ft. girth; head large; branches sub-erect. Young shoots and young leaves silky; branchlets and underside of leaves sometimes pubescent. Leaves 3-6in., glabrous, glaucous beneath, lanceolate, rarely ovate-lanceolate, minutely and regularly serrulate, acuminate. Lateral nerves numerous, prominent. Petiole $\frac{1}{4}$ -1in. Stipules ovate or orbicular, deciduous. Peduncle leaf-leaving. Male catkins 2-4in., on leafy branchlets, sweet-scented; bracts obovate or spatulate, pale, hairy; stamens 5-10. Anthers minute. Female catkins 3-5in. long; bracts pale, smaller. Disk small, $\frac{1}{2}$ annular. Capsules long, stipulate, glabrous or pubescent, in groups of 3-4. Pedicels as long as the capsule, $\frac{1}{10}$ - $\frac{1}{8}$ in. long. Stigmas 2, spreading, sub-sessile, generally entire. Seeds 4-6. Fruiting catkins, sometimes 5in.

Uses:—The bark is stated by Dalzell and Gibson (*Flora of Bombay*, p. ii., p. 82) to be of some account as a *febrifuge*. Mr. Long (*Journ. of Agri.-Hort. Soc. of India*, 1858, vol. x., p. 43) states that the bark yields "a tonic substance." If by this he means *Salicine* (the crystalline principle found in some European species of *Salix*), he is under a mistake, as Sir W. O'Shaughnessy carefully examined this bark, and failed to detect any trace of this principle. (*Bengal Disp.*, p. 606). (Ph. Ind.)

1204. *S. acmophylla*, Boiss., H.F.B.I., v. 628.

Vern.:—Bed (Afg.); Budha (Sind.); Bisu, bada (Pb.); Jalmâlâ (Dehra Dun.)

Habitat:—Himalayan Valleys, Sub-Himalayan tract and Siwaliks from the Ganges westward, Northern Punjab often cultivated. Afghanistan and Baluchistan.

A deciduous, middle-sized, handsome tree, quite glabrous, with flexuose branches, which break off easily from the stem. Young shoots and young leaves silky. Bark $\frac{1}{2}$ in. thick, rough, dark-brown, somewhat corky, deeply and irregularly vertically cleft. Wood soft, porous, even-grained; sapwood white. Trunk attaining 7 ft. girth; branches often pendulous. Crown rounded. Leaves 2-8 in. by $\frac{1}{4}$ - $\frac{3}{4}$ in., pale, those near the catkins much smaller, linear-lanceolate, upper caudate-acuminate, quite entire; lower often sub-acute or mucronate, glabrous and glaucous when mature; lateral nerves faint. Petiole $\frac{1}{3}$ - $\frac{1}{2}$ in. Flowers after the leaves on short, leafy penduncles; bracts ovate or oblong, concave, villous. Male catkins 1-2 in., cylindric, dense-fid. Female catkins 1 in., nodding with deciduous, long haired bracts. Stamens 4-6; anthers short, globose; style short; stigmas 2, sessile entire, spreading. Capsule shortly stipitate, ovoid-oblong, glabrous. (Kanjilal.)

Use:—A decoction of the bark is used in Beluchistan as a febrifuge. (Murray.)

1205. *S. Caprea*, Linn., H.F.B.I., v. 629.

Vern.:—Bed mushk (Pb.); Khwagawala (Pushtu); Khilaf (Arab).

Habitat:—Cultivated in Robilkund and N.-W. India.

A large, deciduous shrub or small tree, 25-30 ft., flowering before leafing. Trunk attaining 3-4 ft. girth. Bark, dark-grey, or yellowish-brown, with irregular, longitudinal clefts and short cross clefts. Wood light-red, soft, even-grained. Leaves 2-4 in., dark-green above, crenate, broadly elliptic or obovate, glabrous and more or less rugose above, grey, tomentose beneath; stipules large, reniform. Catkins densely silky, nearly sessile; male sweet-scented, ovoid-oblong, very stout, erect, 1-1 $\frac{1}{2}$ in. long; bracts tipped black; stamens 2, free. Female catkins 2-3 in., slender, nodding; bracts tipped with black. Capsules downy, shortly stipulate. Stigmas sub-sessile.

Uses:—The flowers yield on distillation a scented water

which is highly valued as a medicine, being cordial, stimulant, and aphrodisiac, and is externally applied in headache and ophthalmia. The ashes of the wood are useful in hæmoptysis, and, mixed with vinegar, applied to hæmorrhoids. The stem and leaves are astringent, and the juice and gum are also used medicinally to increase visual powers. (Dr. Stewart.)

In Europe, the bark of this species of willow was at one time used as a substitute for Cinchona.

The leaves have been found useful in fevers in the form of a decoction. (Asst.-Surg. Bhagwan Das.)

The distilled water from the flowers is useful in palpitation of the heart. (Dr. Perry in Watt's Dic.)

The Persian settlers in India have introduced the flowers (bedmushk) and the distilled water (ma-el-khilaf) of *S. Caprea*, both of which are used by the upper classes of Mahometans and Parsees, who consider them to be cephalic and cardiacal and use them as domestic remedies in almost every kind of slight ailment. Raughan-i-bed, an oil prepared by boiling two parts of the distilled water with one of sesamum oil until the water has all evaporated, is a favorite remedy for cough. (Pharmacog. Ind.)

Chemical composition.—Willow bark has been shown to contain salicin, wax, fat, gum, and a tannin which gives with ferric salts a blue-black precipitate, the liquid becoming purplish-red on the addition of soda. Johanson (1875) has also shown the presence of a kind of sugar having a slightly sweet taste and reducing alkaline copper solution with difficulty, and of the glucoside benzohelicin, $C^{20}H^{20}O^6$. Salicin, a glucoside, crystallizes in colourless plates or flat rhombic prisms, but it usually occurs in commerce in white glossy scales or needles. It remains unaltered in the air, is neutral to test-paper, inodorous, and has a persistently bitter taste.

Bidenguebine or "willow honey," said to be derived from the leaves and young branches of a willow, and to have a feebly saccharine taste.

Bidangubin or "willow honey" has been examined by Raby (Union Pharm., May, 1886, p. 201). It affords about 12 per cent. of sugar, estimated as glucose, and a considerable quantity of a sugar crystallizing in opaque hard crystals like those of sugar of milk. It melts at 150° to a transparent liquid, and dissolves in 5.5 parts of water at 15° C. The formula is given as $C_{12}H_{22}O_{11}$. This sugar evidently possesses considerable affinity to melezitose, from which it differs, according to M. Raby, in not being efflorescent, and in the greater rotatory power of the glucose derived from it by inversion over that obtained from melezitose. The inversion by means of dilute hydrochloric acid also takes place more rapidly. He therefore proposes to call the new sugar bidenguebinose.

1206. *S. alba*, Linn., H.F.B.I., v. 629.

Vern.:—Vivir (Kashmir); Bis, yur, changma, mālchang, chāmna, kalchan, chung, būshan, madānu (Pb.); Bed-i-siah (Afg.); Kharwala (Trans-Indus).

Habitat:—Cultivated in the North-West Himalaya and Western Tibet.

A large, deciduous tree. Bark light-brown; wood white, pink or light-brown, soft, even-grained. Attains a height of 80ft.; flowering after leafing. Branchlets olive, green, yellow, red or purple. Leaves 2-4in., dull-green above, young silky on both surfaces, old glabrous, often glaucous beneath, narrow, lanceolate, acuminate, glandular-denticulate. Stipules silky, $\frac{1}{2}$ - $\frac{3}{4}$ in., falcately ovate or lanceolate, deciduous; petioles eglandular, $\frac{1}{10}$ - $\frac{1}{2}$ in. Catkins on leafy peduncles. Male cylindric, 1-1 $\frac{1}{2}$ in., dense-fid, drooping; bracts oblong, ciliate; stamens 2, free. Female 2-3in., lax-fid; bracts yellow or brown, ciliate. Dish scales 2. Capsules with narrowed tips, sub-sessile, ovoid, glabrous or pubescent; style very short; stigmas 2-fid.

Uses:—The bark yields salicin, a drug largely used in the treatment of acute rheumatism. It is recognised as antiseptic, antipyretic and antiperiodic.

1207. *S. babylonica*, Linn., H.F.B.I., v. 629; Roxb. 712.

Vern.:—Tissi, bhosi (Nepal); Giūr (Kashmir); Bisa, bada katira, bidāi, bitsu bes, besu, wala, majnun, laila, bed maju (Pb.).

Habitat:—Cultivated in the plains of India, and the Himalaya and elsewhere in gardens, etc.

A deciduous tree, with pendent branches, 50ft. Trunk 12ft., in girth flowering and leafing together; males much commoner than females. Branchlets glabrous, shining. Buds thin, acute. Bark grey, $\frac{1}{4}$ - $\frac{1}{2}$ in. thick. Wood soft, porous, even-grained. Leaves 3-6 by $\frac{1}{2}$ in.; midrib prominent, linear-lanceolate, acuminate, serrulate, glabrous or sparsely hairy; stipules falcate, serrate. Catkins very slender on leafy peduncles; males short, cylindric,

curved, slender, pale-yellow, $\frac{1}{4}$ -lin. long; stamens 2, free; bracts lanceolate. Females: as long bracts as in the male, small pale. Capsules sessile, narrowly conic, glabrous or slightly hairy at base. Stigmas 2, sessile, entire.

Uses:—The leaves and bark are considered tonic, possibly from the salicine in them. (Stewart.) They are still much used by native practitioners as astringents and tonics, chiefly in the treatment of intermittent and remittent fevers. (Punjab Products.) The bark is also said to be anthelmintic. (Watt.)

1208. *Populus nigra*, Linn., H.F.B.I., v. 638.

Vern.:—Sâfeda (Pb.); Frast (Kashmir); Prost, farsh, kramali, biûns, (Himalayan names); Yarpa, yûlatt, changma, kabul, kaull (Ladak).

Habitat:—Cultivated here and there in the N.-W. Himalaya, from Simla westward.

A large, deciduous tree. Bark thick, grey or blackish-grey, rough, with numerous characteristic, deep, vertical fissures. Wood soft, even-grained; sapwood white, heartwood reddish-brown. Gamble further adds:—"The variety of the Black Poplar, found in the Himalaya, is almost always the fastigate form known as the Lombardy Poplar; it is very common and conspicuous in avenues in Kashmir, and some trees are 90-100ft. in height and 6 to 7ft. in girth. From the Kuram Valley, Aitchison and Hemsly have described a variety, *afghanica*, with slender branches and small leaves." Branchlets and leaves glabrous. Buds viscid. Leaves with penni-nerved midrib and 3 basal-nerves; almost triangular, acuminate, crenate; blade 2-4in. Petiole 1-2 $\frac{1}{2}$ in. long. Catkins glabrous. Males pink, stamens 15-30. Females lax, drooping, disk shallow; pedicel short. Fruiting catkins 4-6in. long.

Uses:—The bark is officinal in the plains, an *arak* [liquor] being extracted from it, which is considered depurative. (Dr. Stewart.)

In Tuscany, an ointment prepared from the buds is used for hæmorrhoids, and the balsam obtained from the same source is a popular remedy for colds. (Watt.)

1209. *P. ciliata*, Wall., H.F.B.I., V. 638.

Vern. :—Bangikat (Nepal); Sungribond (Lepcha); Garpipal (Kumaun); Chelun (Simla); Safeda, bagnu, asan, pahari pipal (Pb.); Palach (Pb.); Shodar (Pushtu); Piplás (corruption of Poplar), Biáon, Sharphará, Tilaunja, Kapásil (Jamsar.)

Habitat :—Temperate Himalaya, from Kashmir to Bhotan.

A large, deciduous tree. Bark greenish-grey, smooth when young, brown, with deep vertical fissures when old. Wood grey or brownish-grey, soft. Buds viscid, lanceolate, the yellow resinous gum sometimes secreted in large masses. Leaves ovate-lanceolate, broad-ovate, as a rule finely ciliate along the edge, pale and often minutely pubescent beneath, denticulate, usually cordate, 3-6in. by $2\frac{1}{2}$ - $4\frac{1}{2}$ in., 3-5-nerved; lateral nerves 4-6 pairs above the basal, irregularly forked. Petiole 2-5in. long, compressed above. Flowers before the leaves or with young leaves in lateral catkins, raceme-like and drooping. Male catkins 2-4in. long, somewhat interrupted; Perianth bell-shaped. Margins undulate. Stamens numerous, filaments free, short, slender; bract fringed, early caducous, $\frac{1}{2}$ in. long. Female catkins 6-12in. long, lax in fruit. Pedicels as long as flowers. Ovary conical; ovules along the centre of the valves. Stigmas 3-4, nearly sessile, spreading, 2 lobed, disk toothed. Capsule $\frac{1}{3}$ - $\frac{1}{2}$ in. long, ovoid, 3-4-valved, glabrous; seeds numerous. Stipes and hairs of the seeds as long as the capsules. The female tree is common; the male is very scarce.

Use :—The bark is occasionally used as a tonic stimulant and purifier of the blood. (Atkinson.)

1210. *P. euphratica*, Oliv., H.F.B.I., V. 638.

Vern. :—Sufaida; Bahan (Sind) Padar (Baluch); Patki (Brhui); Hodung (Ladak); Sufaida; Junglee bentee (Pb.); Bahân (Pushtu); Pada, padak (Afg.).

Habitat :—Common in the forest belt of Sindh along the Indus "Where subject to inundation, the lower part of the trunk often gets covered with short horn-like roots and shoots, hard spine-like processes are found projecting from the wood

into the bark." (Brandis.) Common also in the Punjab; and planted in the U. P.

A large, deciduous tree, usually gregarious. Bark thick, with irregular, vertical furrows. Wood moderately hard, compact, even-grained. Sapwood white; heartwood red, often nearly black near the centre. Height 40-50ft.; trunk attaining 8ft. in girth. Extremities sometimes hoary, buds slightly pubescent, not viscid; branches terete. Leaves polymorphous; "those of seedlings, young trees, pollard—and coppice-shoots linear, short petiolate, 3-6in. long; those of older trees on branches, with short internodes, as a rule broad—ovate, rhomboid or cordate; blade 2-3in.; petiole 1-2in. The broader leaves are dentate, cut or lobed, while the narrow leaves are generally entire. Intermediate forms frequent on the same tree and on the same branch." (Brandis.) Catkins lax-fid. Male flowers:—bracts oblanceolate, incised; disk orbicular, 8-cleft; stamens 8-12. Female flowers:—disk tubular, 8-12 cleft, membranous, caducous. Capsule turgidly lanceolate, ovoid, sub-sessile, 3-valved, $\frac{1}{4}$ - $\frac{1}{2}$ in., on a long, slender pedicel.

Use:—The bark is used as a vermifuge in the Punjab and Sind. (Stewart.)

1211. *P. alba*, Linn., H.F.B.I., v. 638.

Vern.:—Chitta bagnu, safeda, jangli-frast, fras, chanûn (Pb.); Sperdor, spelda (Afg.); Fras (Kashmir).

Habitat:—N.-W. Himalaya, from Kunawur westwards.

A lofty tree in Europe; in India exceeding 40ft. (Brandis.) Leaf-buds, shoots and leaves beneath, white with cottony tomentum. Leaves oblong—ovate or broadly ovate, dull-green above, or orbicular, sinuately lobed or toothed, palmately on young shoots; petiole 1-2in., laterally compressed. Base 5-nerved, more or less cordate; catkins hairy. Males $1\frac{1}{2}$ -4; stamens 6-10. Females slender shoots. Tips crenate, ciliate. Disk stellate; stigmas 2-2, partate; arms linear. Carpels pedicelled, 2-valved. Capsule 1in., shortly pedicelled.

Uses:—The bark contains some salicine and acts as a tonic; used for purifying the blood and in skin diseases. Bark said to be useful in strangury. (Punjab Products.)

N. O. GNETACEÆ.

1212. *Ephedra vulgaris*, Rich., H.F.B.I., v. 640.

Vern. :—Amsânia, Butshur, Chena (Pb.) Kbanda, Khama (Kunawar); Phok (Sutlej).

Habitat :—Temperate and Alpine Himalaya and Western Tibet in the drier regions, altogether 7-12,000 ft., 12-16,000 ft. in Sikkim.

A low-growing, rigid, tufted shrub, with usually a gnarled stem and erect green branches which are striate and nearly smooth. Bracts connate to the middle, not margined, eciliate, rarely produced into minute linear leaves. Spikelets $\frac{1}{4}$ to $\frac{1}{2}$ inch, subsessile, often whorled; fruiting with often fleshy, red, succulent bracts, 1 to 2 seeded. Seeds bi-convex or plano-convex. (Hooker.)

Uses :—The authors of *Pharmacographia Indica* write :—“A specimen of the Persian plant kindly furnished to one of us by Mr. K. R. Cama of Bombay, was identified at Kew as *E. vulgaris*. Dried branches of the Huma are still brought from Persia to India for use in Parsi ceremonial, and it is considered to have medicinal properties. The plant was used by the ancient Arians, and is probably the same as the Soma of the Vedas * * *

* T. V. Biektine (Bolnitch. Gaz. Botkina, 1891, No. 19, pp. 473—476) has brought to notice the use of a decoction of the stems and roots of *E. vulgaris* as a popular remedy for rheumatism and syphilis in Russia, and of the juice of the berries in affections of the respiratory passages. After administering the decoction himself in a number of cases of rheumatism, acute and chronic, he comes to the conclusion that the plant is especially valuable in acute muscular and articular forms of the disease: the pain is relieved, the pulse becomes less rapid and softer, and the respiration easier. Within 5 or 6 days the temperature becomes normal, the swelling of the joints disappears, and after about 12 days' treatment the patient is cured. In several cases marked diuresis was observed before or about the time that the temperature began to decrease; the drug was also observed to improve the digestion and promote the action of the bowels. In chronic cases the action of *Ephedra* was less marked, and

in two cases of rheumatic sciatica and osteo-myelitis hardly any effect was produced, but it is only fair to remark that antipyrine, salicylate of soda, antifebrine, salol, &c., also failed to afford relief in these two cases. The decoction used by Dr. Biektine was made with 3.85 grams of the drug to 180 grams of water. Kobert has shown that 0.20 gram of ephedrine injected into the veins of dogs and cats produces violent excitement, general convulsions, exophthalmia and mydriasis. (Nouveaux Remedes, Aug. 8th, 1891.) Pharmacographia Indica, III. 369-370.

The American aborigines of Pima use Teamster's Tea (*Ephedra antisiphilitica*, Berland) as a beverage. (B. D. B.)

Chemical composition—Dr. N. Nagai (Tokio Chem. Society, through Chem. Zeit., 1890, p. 441) obtained the alkaloid Ephedrine from the stem of *Ephedra vulgaris* (Ma-oh). Its composition is $C_{11}H_{15}NO$; by oxidation the alkaloid is split into benzoic acid, monomethylamine and oxalic acid. Isoephedrine, melting point $114^{\circ}C.$, is obtained by heating ephedrine, melting point $30^{\circ}C.$, with hydrochloric acid in a closed tube to $180^{\circ}C.$ The constitution of ephedrine is $C^*H^*CH^2CH(NHCH^3)CH^2OH$, and that of isoephedrine is $C^*H^*CH^2C(OH)(NHCH^3)CH^3$.

The hydrochlorate of ephedrine forms acicular crystals which are freely soluble in water. Mr. J. G. Prebble (1889) found the twigs of *E. vulgaris* to contain 3 per cent. of a tannin, giving a whitish precipitate with gelatine and acetate of lead, and a greenish precipitate with acetate of iron. (Pharmacographia Indica).

1213. *E. pachyclada*, Boiss. H.F.B.I., v. 641.

Vern.:—Hum, Huma, (Pers. Bomb.).

Habitat:—Western Himalaya, in the drier regions, and Western Tibet, from Garhwal westwards.

A rather tall shrub, more robust than *E. Vulgaris*, and more scabrid. Branches rather stout, erect, striate, scaberulous, bracts connate to the middle, margined, eciliate, anthers about 6 sessile or subsessile. I can find no good characters in the spikes and flowers except the more or less margined bracts (Hooker).

Uses:—The same as of *E. Vulgaris*. The ashes are used as a snuff and dye in Afghanistan.

N. O. CONIFERÆ.

1214. *Cupressus sempervirens*, Linn., H.F.B.I., v. 645; Roxb. 678.

Vern.:—Sara, sarâs (Hind.); Farâs (Sind); Saruboke (Mar.).

Habitat:—Planted only in N.-W. India.

A tall, evergreen tree. Bark thin, light, peeling off in thin strips. Wood light-brown, moderately hard, close and even-grained. An ornamental tall tree, cultivated in gardens, attaining 100ft. and 9ft. girth of the trunk; branches and their tips erect, with the leaves 4-angled; crown narrowly cylindrical of drak-green foliage. Leaves ovate-oblong, convex, with a gland on either side. Anthers about 4; cones few, scattered, peduncled, lin. diam., globose or oblong; scales of cone tubercled, 3-14, usually lin. diam., with a short, convex or keeled horn or boss. Seeds ovoid or oblong, nucleus angled.

Uses:—Wood and fruit are regarded as astringent and anthelmintic. (Watt.) The fruit is prescribed as an aromatic stimulant in piles. (T. N. Mukerji.)

1215. *Juniperus communis*, Linn., H.F.B.I., V. 646.

Vern.:—Aaraar (Hind.); Chichia (Kumaon); Nûch, pâma, pethra, bentha, betar (Kashmir); Petthri, petthar, betthal wetyar, pâma, giâshûk, lassar, nûch, chûch, betar, dhûp, lewar, langshûr, thelu, gûgil, chûi, shûpa, fruit=haulber, abhûl (Pb.); Langshûr thelu, lewar (Kunawar); Chûni, shuha (Spiti); Sbama (Lahoul); Abhal (Dec.); Fruit=Abhal, habbul-aaraar, samratul-arraar (Arab.).

Habitat:—Western Himalaya, from Kumaon westward.

A dense, diffuse, ever-green shrub. Leaves $\frac{1}{4}$ - $\frac{3}{4}$ in., in whorls of three, straight, spreading or erect; base narrowed, upper surface pale or white, concave; lower green, convex, or obtusely keeled beneath, with a more or less prominent cushion on branchlets, persistent 3-4 years. Flowers axillary, supported by small, imbricating bracts; the male catkins ovoid, yellow, antheriferous; scales broad-ovate, acuminate. The females resembling leaf-buds. Fruit globose, blue-black when ripe $\frac{1}{4}$ - $\frac{1}{2}$ in., very fleshy, ripening in August and September of the year after flowering. Seeds usually 3. Fruit sweet, aromatic, resinous, covered with a handsome, light bloom. Bark thin, reddish-brown, fibrous. Wood white; heartwood yellowish or pale-red,

fragrant, moderately hard. In the Himalayas, the tree rarely attains more than 6-7ft. in height, often with a disproportionately thick stem, 18-24in. in girth.

Uses:—The fruit and the oil are officinal in the Pharmacopœias of India and Great Britain.

The nuts are sold in the bazars of Northern India for medicine, and are prescribed as diuretic and stimulant. Irvine mentions that they are imported into Patna from Nepal, and are used in the treatment of gonorrhœa. (Watt.)

"Juniper fruit and oil possesses carminative, stimulant and diuretic properties. They are useful in different forms of dropsies, either administered alone, or in combination with other diuretics. They have been used in mucous discharges as gonorrhœa, gleet and leucorrhœa; and in some cutaneous diseases. The wood has been regarded as sudorific in its action, and has been substituted for Guaiacum and Sassafras." (Bentley and Trimen.)

1216. *J. recurva*, Ham., H.F.B.I., v. 647.

Vern.:—Tupi (Nepal); Deschû, chakbu (Sikkim); Bettar, bhedâra, bidelganj, thelu, phulu, jhora, gûggâl, bil, ûrûn, agâni (U. P.); Wetyar, bettar, chûch, thelu, phulu (Pb.); Pama (Tibet.)

Habitat:—Temperate and Alpine Himalaya.

An evergreen graceful, blue, glaucous tree attaining 30ft. or straggling, gregarious shrub. Bark brown, thin, peeling off in long fibrous strips. Wood moderately hard, very fragrant; sap-wood white; heartwood light-red. (Gamble.) Branches fastigiate, decurved and ascending, with pendulous branches in large plants. Leaves subulate, imbricate, more or less depressed, in whorls of 3, $\frac{1}{2}$ in. long, lanceolate, pungent, back convex. Branchlets more or less 6-sided. Male catkins and bracts at the end of short lateral leafy branchlets, ovoid, Yellow. Females small, ovules erect. Berries ovoid, pointed, $\frac{1}{3}$ - $\frac{1}{2}$ in. long, shining, dark-brown or blackish-purple when ripe. Seed 1, oblong, not winged.

Uses:—Aitchison reports that the smoke from the green wood is known in Kashmir as a powerful emetic, producing long continued vomiting.

1217. *J. macropoda*, Boiss., H.F.B.I., v. 647.

Syn.:—*J. Excelsa*, Brand., For. Fl. t. 68.

Vern.:—Dhupi, dhupri, chandan, shûpka (Nepal); Dhûp, padam, padmak, surgi (H.); Sûrgi, lewar, newar, dupri, chundan (Kumaon); Chalai, shûpka, shûr, shûrgu, lewar, lui (Pb.); Apûrz (Beluch.)

Habitat:—Inner drier ranges of the Himalaya from Nepal, westward.

A moderate-sized, ever-green tree. Bark thin, reddish-brown, fibrous, peeling off in thin, longitudinal flakes. Wood moderately hard, fragrant; sapwood yellowish; heart-wood red, with a purplish tinge. Height rarely 50ft., trunk short, but of great girth, usually 6-7ft., at times even more, 33 ft. Branchlets sub-distichous, slender. Leaves dimorphic, of the lower branches subulate, of the upper branches and branchlets, scale like. Foliage light and open; the scale-like leaves usually opposite, rhomboid, convex, obtuse, closely depressed up to the apex, with a large, resinous gland on the back, the subulate leaves opposite or in whorls, pungent, $\frac{1}{8}$ in. long. Male catkins on a scaly peduncle at the ends of branchlets, $\frac{1}{8}$ - $\frac{1}{4}$ in. long, closely set with imbricate scales. Berries sub-globose, bluish-black when ripe, very resinous; the tips of the scales forming transverse ridges or crests. Seeds 2-5.

Uses:—The fruit is used medicinally, and appears to have similar properties to that of *J. communis*. The smaller branches, when burnt, are supposed to exercise a deodorising and cleansing influence, and, in Khâgan, they are believed to act as a remedy for the delirium of fever.

1218. *Taxus baccata*, Linn., H.F.B.I., v. 648.

Vern.:—Thûno, birmi, zirnub, birmi (Hind.); Rurmie, bhirmie, sugandh (Beng.); Dingsableh (Khasia); Teheiray sulah, tcheiray gulab (Nepal); Nhare (Tibet); Tingschi, tsash-ing (Bhutia); Cheongbu (Lepcha); Thuner, geli, gallu, lûst (U. P.); Patr (Bomb.)

Habitat:—Temperate Himalaya, extending westwards to Afghanistan, and eastwards to Bhutan and Khasia Hills.

A large, ever-green tree attaining in the Himalayas 10ft. and 20ft. girth of trunk. Branches spreading. Bark thin, purplish-grey, peeling off longitudinally. Wood hard, close and even-grained, smooth; sapwood white, heartwood orange-red, light-red or white. Kanjilal says "though 'generally middle-sized,' the tree is sometimes very large, with a large spreading crown." Trunk short, branches horizontal, foliage dark-green. Leaves flattened, coriaceous, linear, distichous, 1-1½ in. long, 1-nerved, narrowed into a short petiole, no resin canal. Flowers dicecious, on short axillary branchlets, which are densely clothed with imbricating bracts. Male flowers pedicelled, sub-globose, with numerous, peltate scales, each bearing on the underside 3-6 anther-cells, dehiscing longitudinally. Female flower a single, erect ovule, surrounded at the base by a disc which is membranous in flower, but enlarges into a red, fleshy cup, surrounding the seed; testa hard; embryo in the upper portion of the endo-sperm; cotyledons 2, thick, fleshy.

Uses:—"The leaves contain a volatile oil, tannic and gallic acids, and a resinous substance called toxin. Yew leaves and fruits have been given for their emmenagogue, sedative and anti-spasmodic effects. Pereira says that therapeutically the yew appears to hold an intermediate position between Savin and Digitalis, being allied to the former by its acrid, diuretic and emmenagogue properties, and to the latter by the giddiness, irregular and depressed action of the heart, convulsions and insensibility, which it produces. Yew is, however, reported to have one decided advantage over Digitalis by its effects not accumulating in the system, so that it is a much more manageable remedy than Digitalis. Besides its use as an emmenagogue and sedative in the same cases as Savin and Digitalis are administered, it has also been employed as a lithic in calculus complaints; and as an anti-spasmodic in epilepsy and convulsions. According to Dr. Taylor the yew tree is sometimes used by ignorant persons to cause abortion. At the present time, yew is never used in regular medical practice in Europe,

the principal interest attached to it having reference to its poisonous properties. Thus, the leaves and young branches act as a narcotico-acrid poison, both to the human subject and to certain animals, but more especially to horses and cows. Fatal cases of poisoning have also occurred from swallowing the fruit. It is frequently stated that animals may feed upon the young growing shoots with impunity, but that, when these have been cut off, and left upon the ground for a short time, they are, then, poisonous. This is an entirely erroneous notion for yew shoots and leaves are poisonous both in a dried and fresh state. It seems certain, however, that the red, succulent cup of the fruit is harmless, for a fatal case of poisoning has been recorded of a child from swallowing the entire fruit with its contained seed; whilst other children, who had partaken of the fruit at the same time, but who had rejected all but the fleshy cup, suffered no ill-effects." (Bentley and Trimen.)

Dr. Dymock informs me that the dried leaves and twigs of this plant constitute the *talispatr* of the Bombay bazars and druggists' shop. While this is, no doubt, correct, it is rather surprising that the plant *Taxus baccata*, in no vernacular, bears the name *Talisa*, a fact that would point to the name *talispatr* as but of modern application. Gamble says: "the bar, is used in Kunawar as a substitute for, or mixed with, tea; the berries are eaten, and the leaves are exported to the plains as a medicine." In Europe, the berries are (as already stated) regarded as poisonous, but, in Manipur, I have seen them eaten. The tree is common on the mountains bordering on Burma and the Naga Hills. A twig is worn by the young unmarried Naga females as a charm to prevent pregnancy—chastity being exceptional before marriage. It is remarkable that, in Bengal, the *talispatr*, as sold in the bazar, should be an *Abies*, a plant possessed of carminative, expectorant and stomachic properties, while, in Bombay, it should be the poisonous leaves of the yew which possess emmenagogue, sedative and anti-spasmodic properties. See *Abies Webbiana*. (Watt.)

In Northern India, the leaves are largely employed for medicinal purposes, under the name of *birm* or *brahmi*, chiefly

as a remedy for indigestion and epilepsy and as an aphrodisiac. (Irvine.) The bark is used by Kunâwaris as a substitute for tea (Kanjilal.)

The pulp of the ripe fruit is non-poisonous; the kernel contains the taxin. This substance is prepared from its satd. soln. in very dil. Na Cl soln., by Na Cl, NH_3 , NaOH, phospho-tungstic acid, phospho-molybdic acid, potassium mercuric iodide, KI_3 , Esbach's reagent, Au Cl_3 and $(\text{NH}_4)_2\text{SO}_4$. With coned. H_2SO_4 , it gives a red color, and with Killiani's reagent a red ring; KMnO_4 is decolorized in both acid and neutral soln. In CHCl_3 with a layer of coned. H_2SO_4 , a brown ring is formed. The unripe fruit is, perhaps, more poisonous than the ripe. Taxin is not toxic to fish. Rabbits, guinea pigs, and cats, if the dosage is cautiously increased, can stand many times the lethal doses subcutaneously without harm. These animals thus become comparatively immune to this poison very quickly. Game and cud-chewing domestic animals stand moderate amts. of yew needles without harm; horses and other solipeds, though more susceptible, likewise soon easily accustom themselves to taxin. It may be extracted from the wine, into which it passes unchanged, by Et_2O , after adding Na_2CO_3 . The action of taxin consists in motor excitation of the central nerve system, followed by paralysis. (Chem. Abst., Sept. 10, 1915, p. 2403.)

The alkaloid, taxine, was obtained from the green leaves and the air-dried leaves. Its formula is $\text{C}_{37}\text{H}_{52}\text{O}_{10}\text{N}$.

The physiological action of taxine was examined in 1876 by Borchero, who states that, when administered to frogs, rabbits, cats and dogs, it depresses the action of the heart and interferes with the respiratory functions, and that death ensues from suffocation in a short time. It has been asserted, however, that taxine has no action on guinea pigs. Further experiments are required to establish definitely whether the alkaloid is actually poisonous, and if so, how it acts, and whether, as alleged, certain animals are immune to it. (Thorpe & Stubbs, J. Ch. S. 1902, p. 880.)

Autumn-gathered leaves of male and female trees have been investigated. The alkaloid was extracted by digesting the powdered air-dried leaves with 1 per cent. Sulphuric acid for five or six days. The acid liquid was strained and pressed from the leaves, and at once, without concentration, rendered alkaline and extracted with ether. Taxine was obtained in the form of very fine glistening particles by crushing down the residue from the ether extract. It gives precipitate with most of the alkaloidal reagents, and colour reactions with strong sulphuric acid alone, and when this reagent is mixed with nitric acid, molybdic acid, or chromic acid. (Y. E. Thorpe & G. Stubbs Proc. Ch. S. for 1902, p. 123.)

1219. *Pinus longifolia*, Roxb., H.F.B.I., v. 652; Roxb. 677.

Sans.:—Sarala, oleo-resin=sarala drava, sricâsa, kshira.

Vern.:—Salla, saral, chir, chil, oleo-resin=ganda-biroza, chir-kâ-gond (Hind.); Dhûp, sala, dhûp, sula, oleo-resin= dhup,

koto (Nepal); Gniet (Lepcha); Teadong (Bhutia); Kolan, chîr, salla, sapin, kolon, kolain, seed = kalghoza, chalhatti (U.P.); Dhûp (Oudh); Chîr, salla, sapin, kolon, kolan, kolais (Kumaon); Salla, sarl (Kashmir); Chîr chil, drâb chîr, nashtar, nakhtar, ranzuru, gula, thansa, anandar, saral, oleo-resin = ganda-biroza, purified oleo-resin = biroza, sat-biroza (Pb.); Nashtar, nakhtar - Pushtu); oleo-resin = Gandah-birozah (Bomb.); Oleo-resin = Birozeh (Pers.).

Habitat:—Drier Himalayan slopes, from 2,000 to 7,000 feet above sea level.

A large, more or less deciduous tree, eminently gregarious, attaining 100-110ft., but often stunted and gnarled. Trunk usually naked, rarely 12ft. girth. Bark 1-2in. thick, reddish-brown outside, dark-red within, cut by deep fissure into large plates of irregular size, but more or less rounded and on an average about 6in. across. Wood moderately hard; sapwood white; heartwood light reddish-brown. (Gamble.) Branches symmetrically whorled, high up the trunk, forming a rounded head of light foliage. Leaves 9-12in. long, slender, nearly triquetrous; sheath $\frac{1}{2}$ -1in. long, greyish-brown, imbricate, persistent. Male catkins $\frac{1}{3}$ - $\frac{1}{2}$ in. long, cylindric; cones on short stiff stalks, spreading or recurved, solitary or in whorls of 2-5, 4-8in. long, diam. 3-5in.; scales 1-2 by $\frac{3}{8}$ in.; beak thick, pyramidal, pointed and somewhat recurved. Seeds oblong, $\frac{1}{2}$ -1in. long, with the unequal-sided, thin, membranous wing, which latter is rather longer than seed. Cotyledons about 12.

Uses:—The people of Upper India obtain from it tar and turpentine. The former is said to be equal to that obtained by a more refined process in Europe; and the turpentine is stated merely to require attention to render it equal to the imported article. Dr. Hugh Cleghorn (*Jour. Agri.-Hort. Soc. of India*, 1865, vol. xiv., p. i., App. p. 7) speaks of the product being of a superior description, equal, in fact, to Swedish tar. In an economical point of view, this subject may be worthy of attention. (Ph. Ind.).*

* Mr. Puran Singh (Ind. For Rec. IV. Part 1) is of opinion that the oil distilled from *Pinus longifolia* is not of the same quality as the resins of

Internally, the resin is used as a stomachic and externally as a plaster, and is applied to buboes and abscesses for suppuration. The wood is considered stimulant, diaphoretic and useful in burning of the body, cough, fainting and ulcerations.

"The resin is stimulant both externally and internally. Internally, it acts chiefly on the mucous membrane of the genito-urinary organs, and is, therefore, a very good remedy for gonorrhœa. I have used it with success in many cases of this disease, and in a few, with decided benefit, after the failure of copaiba, cubebs, gurjan balsam and turpentine. Dose: from one to three drachms in emulsion with mucilage, four times in 24 hours. As it is very thick, it requires to be mixed well and gradually with the mucilage." (Moodeen Sheriff.)

The resin oil forms a white, rather tough, opaque mass and has a granular structure which is probably due to partial crystallisation of the resin acid. Its odor is extremely pleasant and somewhat resembles that of limestone. It has a Sp. Gr. 0.990, $[\alpha]_D - 7.42'$, acid number 129, ester number 11, and saponification number 140. When distilled with steam, it yields about 18.5 per cent. of a volatile oil, which has the characteristic odour of pinene and a somewhat fainter odour of limonene. The oil has a sp. gr. 0.866 and $[\alpha]_D + 2.48'$. When fractionally distilled, it yields (1) 56 per cent. of a liquid which boils at 165-170° and has $[\alpha]_D - 2'$; (2) 20 per cent. which boils at 170-175° and has $[\alpha]_D + 2.48'$; (3) 9 per cent. which boils at 175-180° and has $[\alpha]_D + 6.50'$; and (4) 15 per cent. which boils at 180° and above and has $[\alpha]_D 180'12'$. The oil probably contains *l*-pinene together with a small quantity of *d*-limonene. The presence of pinene was detected in the first fraction by means of amyl nitrite, but a crystalline nitroso-chloride was not isolated. Attempts to prepare the hydro-chloride and bromine additive compound also failed. The white, crumbly resin which remains after distilling the oil has acid number 142, ester number 13, and saponification number 155; a 10 per cent. solution in a 100 mm. tube has $a_D = 1.10'$. Crystals of a resin acid melting

P. khasya, *P. merkussi* and *P. excelsa*. The oil from this species, owing to its different chemical composition cannot come up to the American and French oils consisting mostly of pinene, but if prepared by adopting better methods of distillation, it is better than the Russian turpentin oil and is not inferior to the American oil when used for paints, varnishes, &c.

According to Messrs Morrison & Co., who examined, and reported on, a sample of oil distilled by Mr. Fernandez at Nainital the results of its application in cases of rheumatism were as good as those obtained with French oil.

This species is not only abundant in its natural habitat, but has been planted more or less successfully in various Indian plain stations, even in Calcutta. Mr. R. S. Troup has recently published in the *Indian Forest Memoirs*, the results of his sylvicultural study of this plant.

at 138-140° separate from the solution of the resin in glacial acetic acid after remaining for 24 hours. (Frank Rahak, *Chem. Centr.* 1905)—J. Ch. S. LXXXVIII., Pt. II., p. 911.

1220. *P. Khasya*, Royle, H.F.B.I., v. 652.

Vern.:—Dingsa (Khasia).

Habitat:—Khasia and Chittagong.

A large, ever-green tree, 100-150ft. in Khasya, in Burma even 200ft., with a trunk 10ft. in girth. Bark thick, with deep cracks. Wood very resinous, moderately hard, pale-brown to red. Resin-ducts numerous in the outer and middle belt of each annual ring. Leaves 6-10in. long, slender, green, serrulate; back convex; sheath persistent, grey, lacerated at apex, $\frac{1}{2}$ - $\frac{3}{4}$ in. Cones solitary or in pair, sometimes in threes, ovoid, 2-3in. long, greatest diam. 2in. Peduncle bracteate. Young cones recurved; beak of scales depressed, pyramidal, with a blunt knob at the end, wings round, topped, 4-times the length of the seed. Seeds $\frac{3}{8}$ in., together with the wing.

Use:—This species also yields Oil of Turpentine, which according to the report of Professor Armstrong, F. R. S., corresponds in properties with French Oil of Turpentine.

1221. *P. Gerardiana*, Wall., H.F.B.I., v. 652.

Vern.:—Gonober, rhi, newr, seeds=chilgoza, neoza (H.); Ronecha, rolecha (Kumaon); Rhi, shangti (Kunawar); Chiri, prita, mirri, galgoja, galboja, kashti, rhi, neoza, shangti, newr, ruminche, roniunchi (Pb.).

Habitat:—Dry interior valleys of the N.-W. Himalaya, from Kunawar westwards and in Garwhal.

A moderate-sized, ever-green tree. Bark very thin, grey, smooth, exfoliating in large, thin scales, leaving rounded shallow depressions, cracked only in very old trees. Wood hard, very resinous; heartwood yellowish-brown. Resin copious. Branches not whorled. Girth 12ft. sometimes. Height 50ft., sometimes 60ft., in congenial soil with proper space to develop its peculiar beauty, it becomes a regular dense, conical tree. Foliage beautifully dark-green, says Brandis. Leaves in trees stout, stiff, 3-5in. long; back rounded, persistent for 3-4 years, serrulate; sheath deciduous, $\frac{1}{2}$ in., entire. Bracts deciduous. Male-catkins $\frac{1}{3}$ - $\frac{1}{2}$ in.

long, diam. 4-5in.; peduncle lin. Scales broad; beak stout, recurved, obtusely triangular. Seeds irregularly cylindric, lin. long, oily, edible; wing short, caducous.

Uses.:—The seeds are considered anodyne and stimulant. The oil extracted from them is highly esteemed for its stimulating and healing powers when applied as a dressing to wounds, ulcers, etc. It is also said by Stewart to be employed as an external application in diseases of the head. (Watt.)

The seeds yield 30.7 per cent. of a very viscous, greenish-yellow oil. Grimme (1911) obtained the following constants: Specific gravity at 15°, 0.9307; solidifying point—17°; acid value, 1.6; saponification value, 191.8; iodine value (Wijs), 118.3. Fatty acids, 91.46; unsaponifiable matter, 1.64; melting point, 0°; solidifying point—3°; iodine value (Wijs), 125.0; neutralisation value, 196.7; mean molecular weight, 285.2.

1222. *Cedrus Libani*, Barrel, var. *Deodara*, Hook., H.F.B.I., v. 653.

Syn.:—*Pinus deodara*, Roxb. 677.

Sans.:—Devadâru, Sarala.

Vern.:—Deodar (H.); Dewdar, geyâr, kelu, pallur, dadâ (Pb.); Devadâru (B.); Devdâr, vânsêo-deodar (Guz.); Devadârû (Mar.); Devadâru-chedi (Tam.); Devadâri-chettu (Tel.); Devatâram (Mal.); Devadâri-marâ (Kan.).

Eng.:—Deodâr, Himâlayan Cedar.

Habitat:—N.-W. Himalaya, from Kumaon westwards.

A horizontal-branched tree, leader and young branchlets pendulous or drooping. Bark brown with a whitish lustre. Branchlets somewhat tuberculose from the persistent bases of the fasciculi of leaves. Leaves growing on branches in tufts 20-60 in number. Young twigs have no tufts, but solitary. Each tuft may be called an arrested bud; young leaves light-green and glaucous, and dark-green as they become older, triquetral (midrib being prominent on the inner side and rounded on the back) stiff, perennial, $\frac{1}{2}$ -2in. long, acicular, acute; stomata about 4 rows of each side of the inner side, and one or two lines of stomata as sometimes only a few irregular scattered stomata on the rounded or outer side. Male catkins numerous, solitary at first, oblong, oval and obtuse, afterwards more

cylindrical. Stamens sub-cylindrical, bilocular, with triangular, terminal, oblique scale. Female cones at first sessile, solitary, of a cylindrical form, of a pea-green colour, covered with a delicate, velvety, bluish bloom. As they advance in growth, they stand erect and solitary in a small peduncle on the upper side of the branches and become brown. They are oval, very obtuse, 2-5in. long, 1-2½in. diam. In their early green stage, most deliciously fragrant. Scales very broad, transversely oblong, flat, fan-shaped, ferruginous, entire, smooth and thin at the edges and somewhat membranaceous. Seeds unequal, somewhat wedge-shaped, with a large, obovate-membranous, brown wing, expanding suddenly on the thinner side, immediately beyond the seed. The majority of male catkins and female flowers are on separate trees. But a considerable number of trees also produce both male and female flowers on the same individuals. The usual girth is from 24-30ft., at times 33-36ft., 4 or 5ft. above the ground. Height 160-180ft., or even 200ft. (Vol. III. P. 225, *Pinetum Britannicum*. Blackwood and Sons, Edinburgh and London, 1884.)

Sir Joseph Hooker says (*Natural History Review*, 1862, p. 17). "It is evident that the distinctions between *Cedrus Deodara*, *Cedrus Libani* and *Cedrus Atlantica* are so trifling and so far within the proved limits of variation of conifera plants that it may reasonably be assumed that all originally sprang from one. It should be added that there are no other distinctions whatever between them of bark, wood, leaves, male cones, anthers or the structure of these, nor in the mode of germination or duration; the girth they attain or their hardiness (the assumed distinctive characters between the Deodar and Lebanon Cedar that were formed on the form of the cones), the falling away of their scales, the shape of the leaf in section, the wood, its odour and durability having all been satisfactorily disproved long ago. * * * *. Though the differences in the scales and seeds of *Deodara* and *Libani* are very marked, they vary much, many forms of each overlap, and further transitions between the most dissimilar may be established by intercalation of seeds and scales from *C. Atlantica*.....My own impression

is that they should be regarded as three well-marked forms, which are usually very distinct, but which often graduate into one another, not as colours do by blending, but as members of a family do by the presence in each of some characters common to most of the others, and which do not interfere with, or obliterate, all the individual features of the possessors." With regard to these observations of Sir Joseph Hooker, the Author of *Pinetum Britannicum* makes the following remark, which is worth reproducing here. It runs thus—"Sir Joseph Hooker very accurately points out the true nature of the relationship of the three Cedars, although it may not be easy to say whether he most inclines to hold them as *species or varieties*." (The italics are mine. K. R. Kirtikar.)

The Author of *Pinetum Britannicum* says that *C. Libani*, *Loud.*, is a closely-allied species.

To show the differences between *Cedrus Deodara* and *C. Libani*, we have inserted a drawing of the latter on Plate No. 928A. *Cedrus Libani* is not indigenous to India—(K. R. K. & B. D. B.).

Uses :—By Sanskrit writers, the aromatic wood is considered carminative, diaphoretic, diuretic and useful in fever, flatulence, dropsy, urinary diseases, etc. It is chiefly used in combination with other medicines. (Dutt.)

It yields a coarse, very fluid kind of turpentine (*Kelon kâ tel*, Hind.), held in much esteem by the natives as an application to ulcers and skin diseases. It appears also to enter largely into their nostrums for the treatment of leprosy (Prof. H. H. Wilson, *Calcutta Med. Phys. Trans.*, vol. i., p. 41). Dr. Gibson regards it as very effectual in this disease when given in large doses. In the 2nd volume of these Transactions, Dr. J. Johnston details a serve case of *lepra mercurialis*, treated externally and internally with Deodar oil, extracted by heat from the wood. Commenting on this case, Dr. Johnston remarks, that the Deodar oil produced the happiest effects by suddenly checking and ultimately curing the disease. A drachm of the oil was as large a dose as the patient's stomach could bear. It always acted as a diaphoretic, and produced

no other sensible effects. It was found extremely variable in its action, in some a drachm causing vomiting, whilst in others half an ounce induced only slight nausea. Dr. Johnston extended its use to other skin diseases with advantage. Dr. Royle (op. cit., p. 352) states that the leaves and small twigs of the Deodara are also brought down to the plains, being much employed in native medicine. They may, doubtless, possess some mild terebinthinate properties. (Ph. India.)

In Kangra, the wood is pounded with water on a stone, and the paste applied to temples to relieve headache. (Stewart.)

The wood is bitter, useful in fever, costiveness, piles and pulmonary complaints. (S. Arjun.)

1223. *Abies Webbiana*, Kindley, H.F.B.I., v. 654.

Vern.:—Palûdar, rewari (Jhelam); Bâdar, bûdar, tûng (Kashmir); Dhûnu, râg, rail, pe, re, salle, sara (Chamba); Tos (Kulu); Spun, pun, krok, kalrei (Kanawar); Morinda (Jaunsar); Bang, dodhma, râgha, teliya or chili râgha (South-Eastern Garhwal); Raunsla or râi salla (Kosi River); Râgha, râo râgha, ransla, raisalla (Kumaon); Gobria, sulah (Nepal); Dumshing (Bhutia.)

Habitat:—Temperate and Sub-alpine Himalaya.

An ever-green tree. Bark greyish-brown, rough. Wood white, soft. "Attains 150ft. Girth of trunk 30ft., says J. D. Hooker. "Usually stunted and gnarled" (Brandis). Josiah Hoopes, of Philadelphia, in his Treatise on Coniferæ, New York, 1889, says "A *Webbiana* is a native of the Himalayas and the Alps of Goosainthan in Nepal at elevations from 9,500 to 12,000 or 13,000ft., where it attains to the height of 70 or 80ft., forming a large, pyramidal-shaped tree, with broad, spreading branches, and in adult specially with a rather tabular formed top." Kanjilal describes the plant thus:—"A lofty tree, with a densely, cylindric crown, pre-eminently shade-enduring; branches pendular; branchlets stout, stiff, spreading horizontally; bark, on young stems, dark-brown or grey; and split into long and narrow scales on old trees. Leaves 1-2 by $\frac{1}{16}$ in., narrow-linear, narrowed into a short petiole, spirally arranged, but declinate on two sides to appear distichous, glossy, dark-green above,

with two faint, white lines either side of the midrib beneath, persistent for at least 3 years; tip emarginate, generally with two sharp cups. Cones always erect, oblong or cylindric, 2-4 in. long, $1\frac{1}{2}$ -3 in. diam., dark-purple when ripe; scales closely imbricate, obovate; edge round. Seeds $\frac{1}{8}$ - $\frac{1}{5}$ in. long, obovoid; wing twice as long broadly obovate, truncate; cotyledons 5-6." (Kanjilal's Forest Flora of Sewalik, etc., p. 434, 2nd Edition, Calcutta, 1911.)

Uses:—The dried leaves of this plant (Talispatra, Hind. and Beng., Talispatria, Sans.)^{*} are regarded as carminative, expectorant, stomachic, tonic and astringent, and useful in phthisis, asthma, bronchitis and catarrh of the bladder. The powdered leaves are often given along with the juice of *Adhatoda Vasica* and honey, and a confection called taliādya churn is prepared from the talispatria along with pepper, ginger, bamboo, manna,

^{*}According to Ainslie and the earlier writers on Indian Economic Botany, talispatrie, talisapatra (Dec. and Hind.); and talisha, vidara (Sans.) were the vernacular names for the dried leaves and twigs of *Flacourtia cataphracta*, the paniyala of Bengal. (Ainslie II, 407.)

Mr. Gamble, in his *Manual of Indian Timbers*, p. 17, gives talispatri as the Hindi name for *Flacourtia cataphracta*, Roxb., and this is also the name given by Babu T. N. Mukharji in his *Amsterdam Catalogue*. I have examined many specimens of the talispatria of our native druggists' shops in Bengal, and they have uniformly been the leaves and twigs of *Abies Webbiana*. Dr. U. C. Dutt writes to me to say that this is also his experience, and that he is of opinion that this is the talispatria of the ancient Sanskrit writers. It seems difficult to account, however, for a man of Dr. Ainslie's ability mistaking the ovate leaf of a *Flacourtia* for the needle-shaped leaves of a Pine, and having few or no authors to compile from, he must have personally identified the plants of which he wrote.

It is probable that the dried leaves of several plants, according to the part of India where met with, receive the name of talispatria, provided they are found useful in the treatment of coughs. It seems likely, however, that the leaves of *Abies Webbiana* are the original or true talispatria. Dr. Dymock informs me that the talispatria of the Bombay shops (also called Birmi) consists of the leaves and young shoots of *Taxus Baccata*, Linn.

The description of the talispatria in old books of Indian medicinal plants would agree very well with the leaves of a *Cinnamomum*, much better, in fact, than with those of an *Abies*. Dr. Moodeen Shariff gives talishapatri as the Tamil and Telegu names for *C. Tamal*, Nees, and also the Arabic and Persian for the leaves of that plant. He may be quite right in this opinion, modern usage having appropriated the name to *Abies*. (Watt.)

cardamoms, cinnamon and sugar. The talispatra also enters into the preparation of numerous complex prescriptions. (U. C. Dutt's Hindu Mat. Med.) Dr. F. Hamilton says the Hindu Doctors of Behar use an infusion of talispatra in the treatment of hoarseness. Hakims affirm that the gum, mixed with oil of roses, when taken internally, produces intoxication. This mixture is used externally for headache, neuralgia, &c. The juice of the fresh leaves is used as a family medicine in fevers, acting as an anti-periodic, for infants, dose 5-10 drops in water or mother's milk. It is also prescribed in affections of the chest and during dentition. In Bengal, it is given as a tonic after parturition.

N. O. ORCHIDEÆ.

1224. *Dendrobium Macraei*, Lindl., H.F.B.I., v. 714.

Vern. :—Joivanti Jiban, Sag (H.); Jibai, Jibanti (B.); Jivanti (M. and G.).

Habitat :—Sikkim Himalaya, Khasia hills, Deccan, Kanara, Nilgiri Hills.

Rootstock creeping annulate. Stems pendulous 2-3ft., branches ending in fusiform pseudo bulbs 2-2½ in. long. Leaves 4-8in., linear-oblong, obtuse, sessile. Flowers 2-3, shortly peduncled, ¾-lin. long, white; pedicels ¾-lin. long. Sepals and petals erecto-patent linear-lanceolate acute, mentum short conic. Bracts basal, sheathing; side-lobes of lip oblong obtuse, sprinkled with red; mid-lobe variable, small with 2 diverging lobules crenulate and crisped, disk between the side-lobes with 2 fleshy crests.

Uses :—This plant is the Jivanti of Sanskrit writers. In the Nighantas it bears the synonyms of Jivani, "life-giving," Jiva "life-giving," Jivaniya "supporting life," Jiva-śreṣṭha, Śaka-śreṣṭha "best of herbs," and Yasas-vini "renowned." It is also spoken of as Jiva-bhadra and Mangalaya "auspicious," and is described as cold, mucilaginous, light, strengthening, and tridoṣha-ghna, i.e., a remedy for the disorder of the three humors of the body, bile, blood and phlegm, known to Hindu

physicians as tridoṣha. The whole plant is used in decoction along with other drugs supposed to have similar properties; it must not be confounded with Jivaka, one of the Aṣṭavarga, which is a drug unknown to the modern Hindus. *D. Macraei* does not appear to have been noticed by any of the European writers upon Indian Materia Medica. (Pharmacogr Ind. III 390.)

The authors of the *Pharmacographia Indica* have isolated from the dried roots and stems, an alkaloid which they have provisionally named *Jibantine* and two acids *A* and *B* Jibantic acid.

1225. *D. chlorops* Lindl., H.F.B.I., v. 719.

Vern. :—Máravar (Malabar).

Habitat :—The Deccan peninsula, from the Concan to Malabar. "In the Thana District I have found it growing on branches of mango trees in the rainy season." (K.R.K.).

Stems tufted, 12-18 in. long, usually slender. Leaves on first year's shoots 2-4 by $\frac{1}{4}$ - $\frac{1}{2}$ in., lanceolate, acute, the second year's shoots leafless and flower-bearing. Flowers $\frac{3}{4}$ in. in diam., with a primrose-like scent when first expanded, in lateral and terminal racemes 3-6 in. long; pedicels and ovary together reaching $\frac{1}{2}$ in. long in flower, slender; bracts below the pedicels $\frac{1}{2}$ in. long, ovate-lanceolate, acute. Sepals cream-colored; lateral sepals $\frac{1}{3}$ in. long by $\frac{1}{8}$ in. broad at the base, oblong-lanceolate, subacute; dorsal sepal $\frac{1}{3}$ in. long, less than $\frac{1}{8}$ in. broad, oblanceolate, obtuse. Mentum conical, $\frac{1}{2}$ in. long. Petals $\frac{1}{4}$ by $\frac{1}{2}$ in., cream-colored, obovate. Lip flat, rather more than $\frac{3}{8}$ in. long; side lobes small, rounded, greenish; mid-lobe large, subquadrate, cream-colored; disk pubescent with a channelled ridge. Column greenish; anther white. Fruit not seen. (Cooke.)

Uses :—The entire plant, recently gathered, chiefly its juice, when given internally, cures all kinds of stomach ache, excites bile and acts as a laxative to the intestines. (Rheede, translated from Latin by K.R.K.)

1226. *Eulophia campestris*, Wall., H.F.B.I., VI. 4.

Vern. :—Salib-misri (H. B. and Pb.); Bongataini (Santal); Hatti-paila (Nepal); Sálum (Guz.); Sung-misri (Per.);

Habitat :—Plains of India ; from the Punjab to Oudh, Bengal, Chittagong, and the Deccan.

Roots tuberous ; hypogæal. Leaves elliptic-lanceolate. Scape 6-18in., stout or slender, unbranched, from a deformed tuber. Sheaths sub-suppressed, acute. Flowers many, subsecund appearing before the leaves. Racemes many-fid. Sepals $\frac{1}{2}$ - $\frac{2}{3}$ in., linear-lanceolate, acute 5-7-nerved, slightly attached to the base of the lip, acute or acuminate, yellow or green, striped with pink. Petals oblanceolate, 3-5-nerved, narrower. Lip as long as the sepals, cuneate-obovate or oblong ; side-lobes short, mid-lobe orbicular, usually purple. Spur conical. Disk with 3 central nerves lamellate at base and tubercled and spinulose on the mid-lobe. Column rather slender. Capsule $\frac{3}{4}$ in., ellipsoid.

Use :—It furnishes *Salep* which is esteemed as a tonic and aphrodisiac.

1227. *E. nuda* Lindl., H.F.B.I., VI. 5.

Vern. :—Ambarkand (H.).

Habitat :—Tropical Himalaya, from Nepal eastwards, Assam, the Khasia Hills, and Mainpur ; the Deccan Peninsula, from the Concan southwards.

Roots tuberous hypogæal ; tall. Tuber large. Leaves 10-14in., elliptic-lanceolate, very variable in breadth. Scape 1-3ft., stout. Sheath appressed ; bracts scarcely equalling the ovary. Sepals 1in. Mentum rounded or conical. Lip shorter than the sepals. Capsule $1\frac{1}{2}$ in., fusiform. Flowers large, green or purple.

Uses :—It furnishes salep. Sir George Watt, in his work "Commercial Products of India," p. 963, writes regarding *Salep*, that

The article obtained in the Indian bazars has been ascertained to be chiefly the product of several species of *Eulophia*, viz., *E. campestris*, *E. nuda* and *E. virens* (*mankand* or Lahore salep of the shops), though probably also from the species of a few other genera, and is produced on the hills of Afghanistan, Baluchistan, Persia and Bokhara ; but the Nilgiri hills and Ceylon are said to furnish part of the Indian supply. The salep of European commerce is procured chiefly from the Levant, and to some extent from Germany, etc., derived mainly from the tubers of *Orchis mascula*. The tubers are dug up after the plant has flowered, and the plump, firm ones are washed and set aside, and subsequently strung on threads, scalded, and dried in the sun or by artificial heat. The commercial article is met with in three forms—palmate, large ovoid, and small ovoid.

Various substitutes are sold in India. The kind known as Royal Salep (*bādshah salab*) has been identified as being derived from a species of *Allium* (*A. Macleanii*, *Baker Bot. Mag.*, t. 6707; Aitchison, *Annals of Botany.*, 1889-90, iii., 149-55) : while the tuberous roots of *Asparagus adsendens* (West Himalaya and Punjab) and of *A. racemosus* (Deccan) are the white *musali*, *Curculigo orchoides*, the black *musali* and certain species of *Habenaria* are also so used. Besides these substitutes, an imitation salep, made of potatoes and gum (known as *banawati salab*), is largely manufactured for the Indian market.

A considerable Trans-frontier trade exists in salep from Afghanistan, Persia, Baluchistan and Bokhara into India. A little trade is also done in collecting and drying in India itself, mostly Kashmir and Lahoul, the tubers of *Orchis latifolia*, but the bulk of the ordinary article met with in the country is imported by sea into Bombay from Persia and the Levant.

1228. *Vanda spathulata*, Spreng., H.F.B.I., VI 50.

Vern.:—Ponnampon-maraiva (Malay).

Habitat:—Western Peninsula, from Malabar to Travancore, and Ceylon.

Stem about 1 ft., leafy, thicker than a swan's quill, rooting upwards; roots very stout, vermiform; internodes 1 in., green; leaves 2-4 by 1½-1¾ in., lorate, keeled, recurved, flat, tip rounded emarginate or 2-lobed, lower leaves sometimes smaller, ovate, sheath green, speckled with red; peduncle from the middle or lower nodes, 12-18 in., erect, robust, with a few distant, short, acute sheaths, green, speckled with red; raceme terminal, 4-5-fid., rhachis stout, bracts broadly ovate, acuminate, pedicel with ovary 1-1½ in., flower 1½-1¾ in. broad; sepal and petal obovate-oblong, tips rounded; lip longer than the sepal, side-lobes small, oblong, erect, mid-lobe much larger, shortly clawed, triangular-ovate, tip contracted, obtuse, spur very short, conical; column very short, rostellum obscure; anther depressed, truncate, pollinia oblong, strap short, spatulate, gland large, 2-fid; fruit 1½ in., obovoid, erect, ribs thick, pedicel 1 in., very stout. A striking species, the long erect peduncles, carrying the flowers high above the bushes over which the plant climbs. (Trimen.)

Uses:—It is supposed on the Malabar Coast to temper the bile and abate phrenzy and the golden yellow flowers, reduced to powder, are given in consumption, asthma, and mania. (Ainslie.)

1229. *V. Roxburghii*, Br. H.F.B.I., VI. 52.

Sans. :—Ráśná, vandáka, nákuli, gandha-nákuli.

Vern. :—Ráśná, náí (H. & B.); Dare banki (Santal); Ráśná (M. & Guz.); Kanapa chettu badanike, neardáu, chitteduru (Tel.).

Habitat :—Bengal, Behar and westwards to Guzerat and the Concan, and southwards to Travancore.

Stem epiphytic 2-3ft., climbing. Leaves præmorse, 6-8in. narrow, complicate. Peduncles 6-8in., 6-10-fid. Racemes sub-erect. Flowers 1½-2in. diam., tessellated with brown. Sepals and petals subequal, clawed, obovate waved, yellowish-green or bluish, except from the clathrate brown nerves, margins white. Lip half as long as the sepals, or more. Side-lobes small acute, mid-lobe panduriform violet, tip dilated, truncate 2-lobed.

Uses :—Under the name of *rásna* the roots of this orchid and of *Acampe papillosa*, are indiscriminately used by native physicians.* “Ráśná root is said to be fragrant, bitter and useful in rheumatism and allied disorders, in which it is prescribed in a variety of forms. It also enters into composition of several medicated oils for external application in rheumatism and diseases of the nervous system.” (*Hindu Mat. Med.*) It is also said to be a remedy for secondary syphilis. In Chutia Nagpur, the leaves pounded and made into a paste, are applied to the body during fever, and the juice is introduced into the aural meatus as a remedy for otitis media. (Campbell.)

* We have already stated (Vol. ii., p. 260) that we consider it probable that the original *Rásna* of the Arians was *Inula Helenium*, as the two drugs, at the head of this article are notably deficient in the properties ascribed to *Rasna* by Sanskrit writers; for instance, the plants under consideration cannot be described as *Gandha-mûla* “having a strong smelling root.” Dutt (*Mat. Med.*, p. 258) remarks :—“Under the name of *rásna*, the roots of *Vanda Roxburghii* and *Acampe papillosa* are both indiscriminately used by native physicians. They are very similar in the appearance of their roots and leaves, though they differ much in their flowers and fruit. One native physician whom I consulted, pronounced both of these plants to be *rásna*; when, however, I showed him the different flowers and fruit of the two species, he was puzzled.” The description of the properties and uses of *rásna* will, we think, convince our readers that the original drug was not what is now used. (*Pharmacogr. Ind.* III. 392-393.)

1230. *Saccolabium papillosum*, Lindl., H.F.B.I., VI. 63.

Syn.:—*Acampe papillosa*, Lindley.

Sans.:—Rásná, gandhát, nákuli.

Vern.:—Kánbher, rásná (Mal.).

Habitat:—Bengal and the Lower Himalaya Mts., from Sikkim eastwards, Assam, the Gangetic Delta and the Circars.

Stem 2-3ft., elongate, epiphytic, branched, scandent, as thick as a goose-quill. Leaves 4-5in., obliquely notched. Scape 1-2in., internode, close. Flowers $\frac{3}{4}$ in. diam., bracts semi-circular, mid-lobe of the lip ovate, spur conical, pubescent within. Ovary very short. Capsule $1\frac{1}{4}$ in., fusiform.

Use:—In Konkan, its roots are considered to have cooling properties. (Dymock.) It is said to be a specific for rheumatism. It is invariably given as a substitute for Sarsaparilla.

In the Concan, *S. Wightianum*, Hook. f., Rheede, Hort. Mal. xii., t. 4, and *S. præmorsum*, Hook. f. Rheede, Hort. Mal. xii., t. 4, very similar plants, are used as Rásna. The Marathi peasants call these plants Kánbher. (*Pharmacogr. Ind.* III 393.)

N. O. SCITAMINEÆ.

1231. *Curcuma angustifolia*, Roxb., H.F.B.I., IV. 210, Roxb. 10, 11.

Vern.:—Tikhur (H. and B.); Ararut-chá-gaddá, Tavakhira (Mar.); Kuve-gadde (Kan.); Ararut-kishangu; Kua (Tam.); Ararut-gaddalu (Tel.).

Habitat:—Tropical Himalaya, from Kumaon to Nepal.

A dwarf herb. Rootstock small, globose; tubers many, oblong, at the end of long fibres. Leaves with short petioles 1-1½ft. blade lanceolate, plain green $\frac{1}{2}$ -1ft. by 2-3in. Spike with peduncle, æstival, $\frac{1}{2}$ -1ft., 3-6 by 2in. diam.; flower bracts lin. green, ovate; pink; bracts of coma few or many. Corolla tube $\frac{1}{4}$ in., lobes of corolla pale-yellow, upper segment ovate, lateral oblong, shorter. Staminate and lip bright yellow, the latter orbicular cuneate, emarginate.

Uses :—The arrowroot from this plant is used medicinally in some parts of the country.

A fairly large trade exists in tikhur or tankir arrowroot all over India. It is used as a substitute for ordinary arrowroot, but regarded as less desirable medically. It is, however, a favourite article of food among the Natives especially for children. The Travancore arrowroot is reported to be not infrequently mixed with the starch of cassava or of tapioca (*Manihot utilissima*, p. 766). In Upper India it is said starch of the sweet-potato is sometimes employed as an adulterant, and in Bombay the colourless young tubers of the ordinary turmeric are mixed with those of this plant.

The late Dr. Lisboa (Notes on Mahableshwar and other Indian Arrowroot-yielding Pl. in Journ. Bomb. Nat. Hist. Soc., 1887, ii., 140-7) gives much useful information regarding this arrowroot. He would appear to think that much of the East Indian Arrowroot of Western India (especially that of Mahableshwar) is derived from the tubers of *Hitchenia caulina*, Baker. [Cf. Cooke, Fl. Pres, Bomb., ii., 728.]—Watt's Commercial Products of India, p. 444.

1232. *C. aromatica*, *Salisb.*, H.F.B.I., vi. 210.

Syn. :—*C. Zedoari*, Roxb. 8.

Sans. :—*Vana haridra*.

Vern. :—Jangli-haldi, ban haldi (H.) ; Banhalud (B.) ; Kapur káchali (Guz.) ; Ránhalad, Kasturimanjal (Tam.) ; Kasturi pasupa, kattu-mannal (Tel.) ; Anakúva, kattu-mannar (Mal.) ; Kasturi-arishnia (Kan.).

Habitat :—Throughout India.

An annual herb, biennial, says J. G. Baker ; growing from the previous year's tubers. Rootstock lin. diam. ; tubers sessile, yellow, aromatic inside. Petiole as long as the blade which is 1-2ft. by 4-8in. Leaves 3 to 4ft. caudate, large oblong persistently pubescent beneath, base deltoid, plain green above or variegated with lighter and darker green. Flowers in dense compound ; spikes crowned by a coma of coloured enlarged bracts ; lower bracts ovate, membranous, enclosing several bracteolate fugitive flowers which open in succession. Spike with peduncles 1ft. produced from April to June with or before the leaves, the later half as long, 3-4in. diam ; flower-bracts ovate pale-green, 1½-2in., those of the coma larger and more or less tinged with pink. Flowers shorter than the bracts. Corolla-tube lin., upper half funnel-shaped. Lobes

pinkish-white, lateral oblong, upper longer ovate concave. Staminode obtuse, as long as the corolla segments. Lip deflexed, orbicular, yellow, obscurely 3-lobed. Stigma obscurely 2-lobed.

Uses.—The rhizomes are used medicinally, being regarded as tonic and carminative. Thwaites says this drug is used by the Singhalese. Dymock states that “the properties of this drug are very similar to those of turmeric, but its flavour being strongly camphoraceous is not so agreeable. It is used medicinally in combination with other drugs as an external application to bruises, sprains, &c. In the Concan, it is applied to promote the eruption in exanthemateous fevers; it is seldom used alone, but is combined with astringents when applied to bruises, and with bitters and aromatics to promote eruptions.” Ainslie says the Muhammadans suppose it to be a valuable medicine in certain cases of snake-bites, administered in small doses, and in conjunction with golden-coloured orpiment, *kust* (*Costus arabicus*) and *ajuan*.

“Used externally in scabies and the eruption of small-pox.” (Surg.-Maj. H. D. Cook.) “Rubbed into a paste with benzoin it is a common domestic application to the forehead for headache.” (Surg.-Maj. John North.)

1233. *C. Zedoaria*, *Rosc.*, H.F.B.I., VI. 210. Roxb. 7.

Sans. :—Karchura, Sati.

Vern. :—Kachura (H.); Shori; Kachura (B.); Kichchilik-kizhanghu, pulán-kizhanga (Tam.); Kich-chili-gaddala, kachoram (Tel.); Kach-cholam, kach-churi-kizhauna, púlá-kizhauna (Mal.); Kachorá (Kan.).

Habitat :—Eastern Himalaya, wild; cultivated throughout India.

Rootstock large, ovoid, tubers many, some lin. diam., sessile, cylindric, and many, oblong, terminating into fibres. Leaves 1-2ft., oblong acuminate, narrowed to the base. Petiole longer than the blade. Spikes vernal, $\frac{1}{2}$ ft. by 3in. broad. Flowering bracts $1\frac{1}{2}$ in., ovate green, often tinged slightly with red; bracts of the coma many, spreading, bright red. Flowers pale-yellow, rather shorter than the bracts. Calyx whitish,

obtusely-toothed, scarcely half as long as the Corolla-tube. Corolla-tube funnel-shaped; lateral segments oblong, upper rather longer, ovate convex. Lip $\frac{1}{2}$ in. broad, orbicular, deflexed obscurely 3-lobed, emarginate. Capsule ovoid-trigonal, smooth, dehiscing irregularly. Seeds oblong, aril lanceolate, white.

Uses:—The fresh root is considered to be cooling and diuretic, it checks leucorrhœal and gonorrhœal discharges and purifies the blood. The juice of the leaves is given in dropsy. (Rheede.) The rhizomes possess aromatic, stimulant and carminative properties. Employed as a stomachic, and also applied to bruises and sprains. The root is chewed to correct a sticky taste in the mouth; it is also an ingredient in some of the strengthening conserves which are taken by women to remove weakness after childbirth. In colds it is given in decoction with long pepper, cinnamon and honey, and the pounded root applied as a paste to the body. (Dymock.)

Zedoary contains, according to Bucholz (*Repert. Pharm.* xx., 376), volatile oil, a bitter soft resin, a bitter extractive matter, gum, starch, &c. The oil is turbid, yellowish-white and viscid, has a camphoraceous taste and smell, and consists of two oils, one lighter, the other heavier than water. Trommsdorff obtained from the root a substance which he called *Zedoarin*, but did not further describe it. A proximate analysis afforded:—

Essential oil, resin, curcumin, &c. ...	...	...	3.79
Resins, sugar ...	...	...	.90
Gum and organic acids ...	...	...	15.22
Starch ...	...	...	17.20
Crude fibre ...	...	...	10.92
Ash ...	...	...	6.06
Moisture ...	...	...	10.31
Albuminoids, Arabins, &c. ...	...	...	35.60

100.00

(*Pharmacog. Ind.* III. 402-403.)

1234. *C. casia*, Roxb., H.F.B.I., VI. 212. Roxb. 9.

Vern.:—Kálo-holud, nil-kantha (B.); Káli-halada (Mar.); Nar-kachúra (Bom.); Nar-kachúr, kalí-haldi (H.); Mánupasupú (Tel.).

Habitat:—Bengal.

Resembles *C. Zedoaria*, *Rosc.*, but differs widely in the colour of the root. Rootstock ovoid, sessile, large, tubers pale-grey inside. Petiole long, green. Leafy tuft about 3ft. Leaves large, oblong, with a broad purple-brown cloud down the middle, blade 1-1½ft. by 5-6in., glabrous beneath. Spike produced dense 5-6 by 2½-3in. diam.; flower bracts green, ovate, very obtuse, 1½in.; bracts of the coma rather longer, many, bright red. Flowers pale-yellow, rather shorter than the bracts. Corolla limb red. Lip ½in. broad obscurely 3-lobed mid-lobe emarginate. (J. G. Baker.)

Uses :—It is considered to have nearly the same medicinal properties as *C. Zedoaria*. The Turkomans employ these roots as a rubefacient, to rub their bodies down with after taking a Turkish bath. (Aitchison.) In Bengal, it is used in the fresh state like turmeric.

1235. *C. amada*, *Roxb.*, H.F.B.I., VI. 213. *Roxb.*, 12.

Vern. :—Âmâ-haldi (H.); Am-ádá (B.); Ambá-halada (Mar.); Amki-adrak (Dec.); Mamidi-allam (Tel.); Kájura gauri (Bomb.).

Habitat :—Bengal and the Concans native, and widely cultivated under the name of Mango ginger.

An annual. Rootstock large ovoid; sessile tubers thick, cylindric deep or pale-orange when mature, not pale-yellow. Leafy tuft 2-3ft. Petiole as long as the blade which is 1-1½ft. by 6in. or more in breadth, plain green tapering gradually to the base and apex. The form of the leaf is at times oblong-lanceolate as described by some Botanists. Peduncle ½ft. or more hidden by the sheathing base of the leaves. Spike autumnal, 3-6in. by 1½in. diam.; flower bracts about 1in. pale-green; those of the coma-tinged pink. Flowers pale-yellow, about as long as the bracts. Corolla whitish. Lip pale-yellow.

Uses :—The rhizomes are regarded as cooling and useful in prurigo. They are also employed as carminative and stomachic. Locally applied over contusions and sprains. Roots are expectorant and astringent, useful in diarrhoea and gleet.

Chem. Comp.—A proximate analysis of this curcuma afforded—

Essential oil, resin, &c.	...	...	...	...	4.47
Resins, sugar, &c.	...	...	...	...	1.21
Gum, organic acids, &c.	...	...	...	...	10.10
Starch	...	...	...	...	18.75
Crude fibre	...	...	...	...	25.20
Ash	...	...	...	...	7.57
Moisture	...	...	...	...	9.76
Albuminoids, &c.	...	...	...	...	22.94

100.00

(Pharmacogr. Ind. IV. 405).

1236. *C. longa*, Linn. H.F.B.I., VI. 214 ;
Roxb. 11.

Sans. :—Haridrā, nisā.

Vern. :—Haldi (H.) ; Halud (B.) ; Haldar, balja (Pb.) ; Manjal (Tam.) ; Pasupu (Tel.) ; Mannal, marinalu (Mal.) ; Arishina (Kan.) ; Halede (Mar.) ; Halada (Guz.).

Habitat :—Widely cultivated throughout India.

An annual. Rootstock large, ovoid ; sessile tubers brightly-yellow inside, thick, cylindric. Leafy tuft 4-5ft., petiole as long as the plain green blade, which is 1-1½ft. by 4-8in. broad, oblong, narrowed to the base. Peduncle ½ft. or more, hidden by the sheathing petioles. Spikes autumnal 4-6in. by 2in. diam. Flower-bracts pale-green, ovate 1½in. Coma-bracts tinged with pink. Flowers pale-yellow, as long as the bracts ; like those of *C. aromatica*, Salis, in structure.

Uses :—Used as a stimulant in native medicine ; externally applied in pains and bruises, and internally administered in disorders of the blood. Its use as an external applicant in bruises, leech bites, &c., is perhaps its most frequent medicinal application. The fresh juice is said to be an anthelmintic. A decoction of the rhizomes is applied to relieve catarrh and purulent ophthalmia.

A paste made of the flowers is used in ringworm and other parasitic skin diseases. Dymock says the Muhammadans use turmeric medicinally in the same manner as the Hindus ; they also prescribe it in affections of the liver and jaundice on account

of its yellow colour. The editor of the *Pharmacopœia of India* speaks favourably of the use of a decoction of turmeric in purulent conjunctivitis; he says it is very effectual in relieving the pain. In coryza he states that the fumes of burning turmeric directed into the nostrils cause a copious mucous discharge, and relieve the congestion. Murray remarks that it is given by the native doctors in the diarrhœas which are so troublesome and difficult to subdue in atonic subjects. Baden-Powell remarks that it is employed in "intermittent fevers and dropsy. It contains much essential oil and starch and acts as a stimulant and aromatic tonic.

The root, parched, and powdered, is given in bronchitis in doses of grs. xxx to xl. (Civil Surgeon J. Anderson, M. B., Bijnor.) The smoke produced by sprinkling powdered *haldi* over burnt charcoal will relieve scorpion sting when the part affected is exposed to the smoke for a few minutes. A paste made of fresh rhizome is applied on the head in cases of vertigo. Fresh juice is cooling. Fumes of burning root is employed during hysteric fits. (T. N. Ghose.) Turmeric and alum in the proportion of 1 to 20, is blown into the ear in chronic otorrhœa. (Dr. Darasha H. Baria.)

Turmeric contains about 1 per cent. of an essential oil. *Curcumin*, the yellow-colouring matter of turmeric, has been examined by several chemists, whose experiments have led to the conclusion that its formula is either $C_{10}H_{10}O_3$ or $C_{16}H_{14}O_4$, that it melts at 172° , forms red-brown salts with alkalis, is converted by boric or sulphuric acid into *rosocyanine*, by reduction with zinc-dust into an oily body, by oxidation into oxalic or terephthalic acid, and by fusion with potash into protocatechuic acid. (Pharmacogr. Ind. III. 412.)

1237. *Kæmpferia galanga*, Linn. H.F.B.I., VI. 219
Roxb. 5.

Sans. :—Chandra malika.

Vern. :—Chandra mûla (H. and M.); Chandú mûlá, humalá (B.); Katsjulam (Mal.); Katsjolan (Tam.); Kachoram (Tel.).

Habitat :—In the plains throughout India; much cultivated for its highly fragrant root of great commercial value sold in the bazaars as Kachari in Bombay. (K. R. K.)

An artomaic annual herb. Rootstock tuberous. Root-fibres

cylindric. Leaves sub-orbicular, sub-sessile 3-6in. long, aromatic, spreading flat on the ground, tip deltoid, thin, deep green, 10-12-ribbed, margin not thickened nor coloured. Petiole short, channelled. Flower 6-12in. fugitive, sweet-scented, opening successively; bracts lanceolate, green, small. Calyx as long as the bract. Corolla-tube lin.; segments lanceolate, $\frac{1}{2}$ in. Stamnodes half an inch long and broad, obovate—cuneate white; lip white with a lilac throat deeply bifid below in middle, lin. broad, lobes obtuse. Anther-crests, small, quadrate, with 2 shallow obtuse lobes. Fruit not seen by me among the Bombay grown species. (K. R. K.)

Uses:—It is probable that the tubers of this species as well as of *K. rotunda* are used indiscriminately in Hindu medicine. They are fragrant and of a warm, bitterish, aromatic taste. (Ph. Ind.) Used by the Hindu ladies as a perfume for the hair. The tubers reduced to powder and mixed with honey are given in coughs and pectoral affections. Boiled in oil it is externally applied to stoppages of the nasal organs. (Rheede.)

Chem. comp.—The fatty matty matters dissolved out of this tuber by either consisted of a fragrant liquid oil, and a solid white crystalline substance separated by petroleum ether. The alcoholic extract, amounting to 2.76 per cent., contained some white transparent prisms of an alkaline nitrate, and a few nodules of a circular-shaped crystals of a yellowish colour. This extract contained a small quantity of alkaloid, and some sweet body reducing Fehling's solution. A large quantity of starch is present, and 4.14 per cent. of gum. The tubers dried at 100°C lost 4.11 per cent. of moisture, and yielded 13.73 per cent. of mineral matter. (Pharmacogr. Ind., III. 416.)

1238. *K. angustifolia*, *Rosc.*, H.F.B.I., VI. 219. Roxb. 6.

Vern.:—Kanjān-būra, madú-nirbisha (H. & B.).

Habitat:—Foot of the Eastern Himalayas; also in Bengal.

Rootstock tuberous; root fibres slender or cylindric. Leaves ascending, lanceolate, many, 6-8in. by lin. or less sessile. Flowers few, in a central sessile spike; bracts small. Calyx lin. Corolla-tube white, twice as long as the calyx; segments lin., linear, very narrow, white, reflexing. Stamnodes erect, oblong, white, $\frac{1}{4}$ - $\frac{3}{4}$ in. Lip reflexed, $\frac{1}{2}$ by $\frac{3}{4}$ in., lilac, deeply cut into

2 sub-orbiant, obovate lobes, about half way down ; anther-crest quadrate, shallowly bifid.

Use :—The people of Bengal use the roots as a medicine for their cattle. (Roxburgh.)

1239. *K. rotunda*, Linn., H.F.B.I., VI. 222. Roxb. 6.

Sans. :—Bhûmichampaka.

Vern. :—Bhuichampa (H. & B.) ; Bhuichampo (Guz.) ; Konda kalava (Tel.) ; Malan-kua (Mal.).

Habitat :—Throughout India.

An annual, rootstock tuberous, outside yellowish-brown, inside yellowish-white ; rootlets white, numerous, 2 or 3 in. long, bearing fascicles of numerous, oblong bulbs, 1-2 in. long. Bulbs glabrous, mucilaginous inside. Leaves radical, oblong, erect, petioled, 1 ft. by 4-6 in., rich, purple beneath, green above. Petiole sheathing. Spikes 4-6-fid, produced in March and April before the leaves. Flowers erect, scapose, 4-6 to the scape, fragrant, large, of various colours, white, pink, yellow and purple, harmoniously blended in one and the same flower. Bracts oblong, acute, outer short, inner 2-3 in. long. Calyx nearly as long as the corolla-tube, white, membranous, somewhat gibbous ; apex generally two-toothed and of a dotted purplish colour. Corolla tube 2-3 in. ; segments spreading, long, linear, nearly as long as tube. Staminodes 1½-2 in., oblong, erect, white. Lip rather shorter, reflexed, 2-fid, to below the middle lobes ¾-1 in. broad, deeply tinged with lilac or red-purple, cut into two sub-orbicular lobes. Anther-crest deeply bifid, cut half way down into two lanceolate lobes, with often a small tooth between. (J. G. Baker.)

Uses :—According to Sanskrit writers the root, used in the form of a poultice, promotes suppuration. (U. C. Dutt.) Rheede informs us (*Hort. Mal.*, II., 18) that the whole plant, when reduced to powder and used in the form of an ointment, has wonderful efficacy in healing fresh wounds, and that, taken internally, it removes any coagulated blood or purulent matter that may be within the body ; he adds that "the root is a useful medicine in anasarcous swellings." Dr.

Dymock writes that in Bombay a powder of the tubers "is used as a popular local application in mumps (*Galgand*), but as they are generally combined with more active remedies, such as Croton seed, Aconite, and Nux-vomica, it is probable that they do not contribute much to the cure." "The substance of the rhizomes and tubers is of a pale straw-colour, has a bitter, pungent, camphoraceous taste, much like that of true Zedoary; the whole plant is aromatic." In the Gazetteer of the Rewa-Kanta District, it is stated that the roots are stomachic and are also applied to swellings. Thwaites remarks that in Ceylon the root is employed medicinally, but he does not state for what purpose. The almost universal belief (from one side of India to the other) that the rhizomes are useful in reducing swellings, would suggest the desirability of this subject being more carefully investigated in the future. (Watt.)

1240. *Hedychium spicatum*, *Hamilt.*, H.F.B.I., VI. 227.

Sans.:—Karpurakáchali.

Vern.:—Sit-rutí, kapúr kachri (Hind.); Kachur-kachu, ban kela, sákí, banhaldí, khor, shalwí, shedúri, (Bazár root)=kapúr kachrí, kachúr (Pb.); Kapur kachari* (Mar. and Guz.); Shimai-kich-chilik kishangu (Tam.).

Habitat:—Sub-tropical Himalaya; Nepal; Kumaon.

A perennial herb. Rootstock horizontal, tubrous; root fibres not much thickened. Stem elongate, leafy. Leaves reaching 1ft. or more, very variable in breadth, glabrous, oblong or oblong-lanceolate. Spike sometimes 1ft., dense-fid. Bracts oblong, obtuse, green, large, 1-fid, 1-1½ by ¾ in. broad. Flowers ascending and closely imbricate, white. Calyx shorter than the bract. Corolla-tube 2-2½ in.; segments lin., linear. Staminate node lin., lanceolate; lip cuneate, deeply bifid, ½-¾ in., broad, not at all clawed. Stamen 1, rather shorter than the lip; anther linear, ¼-½ in., 2-celled, connective very narrow, neither

* It is a mistake to call this plant Kapur Kachri. The real Kachri is *Kempferdia galanga*. The Maráthi name of *Hedychium spicatum* is Sonatakka. (K. R. K.)

spurred nor crested. Filament pale-red, long, slender. Lateral staminodes broad. Style slender, long, filiform. Stigma subglobose. Ovary 3-celled; placentas axillary. Capsule glabrous, globose.

Use :—The aromatic root-stocks are used as a stomachic, carminative, tonic and stimulant.

Chem. comp.—The dried tubers have been examined by J. C. Thresh (*Pharm. Journ.* [3] XV. 361). The proximate analysis gave the following results:—

Soluble in petroleum ether—

Ethyl-methyl-paracoumarate	3.0	} 5.9
Fixed oil and odorous body	2.9	

Soluble in alcohol—

Indif. substance ppt. by tannin	} 2.7
Acid resin, &c.	

Soluble in water—

Glucoside or saccharine matter	...	...	...	...	1.0
Mucilage	...	...	...	...	2.8
Albuminoids, organic acid, &c.	...	...	...	...	1.9
Starch	...	...	...	...	52.3
Moisture	...	...	...	...	13.6
Ash	...	...	...	...	4.6
Cellulose, &c.	...	...	...	...	15.2

100.0

(*Pharmacogr. Ind.* III. 418-419.)

1241. *Amomum xanthioides*, Wall., H.F.B.I., VI. 239.

Vern. :—Iláyechi (H.); Elách (B.); Elam (Tam.); Elakulu (Tel.); Eláchí (Mar.).

Habitat :—Tenasserim; Tavoy.

Herbs, perennial, widely creeping. Root-stock leafy; stems 5-6ft. Leaves 1-1½ft. by 1½-3in., firm, bright-green, lanceolate, glabrous. Spike globose, shortly peduncled, lin., few-fid. Peduncle arcuate, glabrous, slender, 2-3in.; outer bracts ½-¾in., acute, glabrous, small, oblong. Corolla tube under lin.; segments oblong, ⅓-½in. Lip cochleariform, bifid, longer than the corolla-segments with an orbicular blade, ¼-¾in. broad, narrowed suddenly to a broad claw. Anther-crest auricled on each side, short, broad, entire. Capsule rigid, echinate, oblong-trigonus, pale-brown, under lin. long.

Uses :—The seeds are stimulant and carminative, and are useful in all the affections in which the common cardamoms are indicated. They are also of great service in relieving tormina and tenesmus, and even frequency of motions, in some cases of dysentery, and, for this purpose, they must always be used in powder with butter. They are administered in simple powder and compound tincture, the latter being prepared in the same way as the Tincture Cardamom Co. of the Pharmacopœia of India. Dose of the powder, from 20 to 40 grains, and of the tincture, from ʒi to ʒii. (Moodeen Sheriff, Khan Bahadur, Madras.)

1242. *A. subulatum*, *Roxb.*, H.F.B.I., VI. 240. *Roxb.* 15.

Sans. :—Brihat upa kunchikâ ; Ela.

Vern. :—Barí-iláchí (H.) ; Bara-elách (B.) ; Elachi, elcho, moto-iláchi (Guj.) ; Mote-yeldode (Mar.) ; Periyaelakkáy, káttu-elak-káy (Tam.) ; Peddaelakáyalu, adaviyela-káya (Tel.) ; Doddá-elakkí (Kan.) ; Perelam, periya-elattari (Mal.).

Habitat :—Eastern Himalayas.

Root-stock perennial, widely creeping. Leafy stem 3-4ft. Leaves 1-2ft. by 3-4in., green, glabrous on both surfaces, oblong, lanceolate. Spike globose, very dense, shortly peduncled, 2-3in. ; bracts red-brown, outer ones lin., ovate, obtuse, with a horny cusp, inner shorter and obtuse. Calyx and corolla-tube lin. ; segments subulate, shorter than the tube. Lip obovate, cuneate, emarginate, yellowish-white, rather longer than the corolla-segments. Filaments very short, anther-crest entire, small, truncate. Capsule densely echinate, lin., globose, red-brown.

Uses :—The seeds yield a medicinal oil. It is an agreeable, aromatic stimulant.

“ It acts as a stomachic, and is said to allay irritability of the stomach produced either by cholera or some other affections. The decoction of cardamom is used as a gargle in affections of the teeth and gums. In combination with the seeds of melons

it is used as a diuretic in cases of gravel of the kidneys." (Assistant-Surgeon Gholam Nabi.) "Invaluable in certain disorders of the digestive system, marked by scanty and viscid secretion from the intestines, promotes elimination of bile, and is useful in congestion of the liver." (Surg. J. Maitland, M. B., Madras.) "Very useful in liver affections, especially where abscess threatens; dose x grains." (Surg.-Maj. C. R. G. Parker, Pallaveram, Madras.) "I have found it most useful in neuralgia in large doses, 30 grains, in conjunction with quinine." (Surg.-Maj. H. D. Cook, Calicut.) "Used in gonorrhœa as an aphrodisiac." (Surg.-Maj. J. J. L. Ratton, M. D., Salem.) —Watt's Dictionary.

1243. *A. aromaticum*, Roxb., H.F.B.I., VI. 241. Roxb. 15.

Vern. :—Morang-iláchi (H. & B.); Veldode (Mar.).

Habitat :—Eastern Himalayas; Nepal; Sikkim; Khasia Hills; Silhet and Northern Bengal.

Root-stock perennial, widely creeping. Leafy stem 3-4ft. Leaves $\frac{1}{2}$ -1ft. by 2-4in., glabrous on both sides, oblong-lanceolate. Spike small, globose. Peduncle short, rarely longer and decumbent. Outer bracts lin., small ovate, pale-brown. Corolla-tube lin.; segments obtuse, nearly as long as the tube, white, tinged with brown. Lip pale-yellow, twice as long as the corolla-segments, outer half deflexed. Anther-crest large, trifid, petaloid, lobes rounded. Capsule lin., oblong, trigonous, neither costate nor echinate.

Use :—The seeds and oil used like the preceding species.

1244. *Zingiber officinale*, Zosc., H.F.B.I., VI. 246. Roxb. 16.

Sans. :—Plant=âdraka, sringavera; dried root=vishva-bhishagam, nâgara, sunti, mahaushadha; fresh root=âdrakam.

Vern. :—Pl.=adrak, dr. rt.=sonth, sindhí, fr. rt.=adrak, (H.); Pl.=âdâ, dr. rt.=sûnt, fr. rt.=âdâ (B.); Pl.=ada, adrak, dr. rt.=zangzabil, sûnth, fr. rt.=zunjbel, adrak (Pb.); Pl.=âle

(Mar.); dr. rt.=sûnt, fr. rt.=âdû (Guz.); dr. rt.=shukku, fr. rt.=inji (Tam.); Pl.=allam, dr. rt.=sonti, allam, fr. rt.=allam (Tel.); dr. rt.=vana-sunthi, fr. rt.=hasisunthi (Kan.); dr. rt.=chukka, fr. rt.=inchi (Mal.); Pl.=khyen-seing, dr. rt.=ginsi-khiáv, fr. rt.=gin sîn (Bur.); dr. rt.=velicha-inguru, fr. rt.=amu-inguru (Sing.); dr. rt.=zanjabil, zanjabile-yâbis, fr. rt.=zanjabile-ratab (Ar.) dr. rt.=zanjabil-e-khushk, fr. rt.=zanjabil-e-tar (Per.).

Habitat :—Cultivated throughout India.

Root-stock bi-ennial, bearing many, sessile, aromatic tubers, Leafy stems 3-4ft. Leaves 6-3 by 1in., tapering gradually to the point, lanceolate dark-green, glabrous beneath. Spike 2-3 by 1in., oblong, cylindric. Peduncle $\frac{1}{2}$ -1ft. Bracts about 1in., greenish, sub-orbicular, cuspidate. Corolla segments lanceolate, greenish, subequal, under one inch long. Lip small, purplish-black, shorter than the corolla-segments. Midlobe orbicular, lateral ovate. Stamens dark-purple, as long as the lip. "Very rarely flowers, and has never seen seed." (Roxburgh.)

Uses :—Ginger is officinal in the British as well as Indian Pharmacopœia. Its uses are too well known to be detailed here.

1245. *Z. Zerumbet*, Smith, H.F.B.I., VI., 247. Roxb. 17.

Sans. :—Sthula-granthi.

Vern. :—Mahâbari bach; Nar-kachur (H. & B.); Kachur, narkachur (Pb.); Kathu-inshi-kua (Mal.).

Habitat :—Widely cultivated throughout India.

Herbs. Root-stock very large, tuberous, pale-yellow within, hard, bi-annual, root-fibres vermiform. Leafy stem 5-6ft., about $\frac{1}{2}$ in. diam., cylindric, glabrous, annual. Leaves 10-12 by 2-3in., sessile, oblong-lanceolate or oblanceolate, acuminate, glabrous; base narrowed, ligule, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, truncate membranous. Flowering stem 12-18in., stout, usually flexuous, clothed with long appressed obtuse sheaths, with sometimes rudimentary blades. Spikes 3-4in. by 2in. diam., conico-

oblong, bracts 1-1½ in., closely imbricate, ovate-oblong, tip rounded, glabrous, green, bright-red in fruit. Margins membranous. Calyx-tube 1 in., appressed to the corolla-tube, 3-toothed, glabrous. Corolla-tube 1¼ in., segments ovate-lanceolate, acuminate; lateral smaller, adnate to the base of the lip. Lip shorter than the corolla-segments, 3-fid; lobes obtuse, median, longest; anthers glabrous. Style glabrous; stigma minute, funnel-shaped; mouth ciliate. Fruit 1 in., long, oblong. Seeds ½ in., long, oblong, black. Flowers very pale, the lip rather darker.

Uses:—This wild ginger has the aromatic flavour of *Z. Officinale*, mixed with some bitterness. The rhizome is used like the officinal ginger. It is employed as a hot remedy for coughs, asthma, "special diseases," worms, leprosy and other skin diseases. (Baden-Powell.)

1246. *Z. Casumunar*, *Roxb.*, H.F.B.I., VI., 248. *Roxb.* 17.

Sans.:—Van-ardraka.

Vern.:—Ban-ādā (H. & B.); Nisa, Malabari halad (Mar.); Kāru allamu, Kāra pasupu, Karpushpaī (Tel.).

Habitat:—From the Himalaya to Ceylon and Malay Peninsula, Konkan. Southern Maratha Country, Western Ghats, Kanara, widely cultivated.

Root-stock perennial, bright-yellow inside. Leafy stem 4-6 ft. Leaves 12-18 by 2-3 in., oblong-lanceolate, pubescent beneath. Spike oblong, 4-6 in. 1½-2 in. diam.; peduncle 3-12 in.; bracts ovate, 1-1½ in. and nearly as broad, bright-red or greenish-red, or reddish. Corolla-segment whitish; lip unspotted, yellowish-white, with a deeply bifid, ¾ in., broad and long, mid-lobe basal; auricles large, oblong, obtuse. Corolla-tube as long as the bract; segments 1 in., upper broader and more concave. Stamen yellowish-white, shorter than the lip. Capsule small, globose.

Uses:—It has a similar reputation to the officinal ginger, and in the Konkans is considerably used as carminative stimulant in diarrhoea and colic. (Dymock.)

Chem. comp.—The drug yielded to analysis—

Ether extract (essential oil, fat, and soft resins)	...	6.96
Alcoholic extract (sugar, resins)	... ..	7.29
Water extract (gum, acids, &c.)	... ..	13.42
Starch	... ..	15.08
Crude fibre	... ..	12.61
Ash	... ..	6.80
Moisture	... ..	7.66
Albuminoids, modifications of arabin, &c.	... ..	30.18
		100.00

The root had a pungent odour, similar to a mixture of camphor and nutmeg, the soft resin had a bitter and burning taste. The colouring matter had many of the reactions of curcumin, but was more readily bleached than true curcumin, and the colour of the powder was very fugitive. The water extract gave a crystalline precipitate with lead acetate, which was found to be due to the presence of malic acid. The root contained more mucilage and sugar than that of *Curcuma aromatica*. (*Pharmacogr. Ind.* III, 427.)

1247. *Costus Speciosus*, Smith, H.F.B.I., VI., 249;
Roxb. 20.

Sans. :—Kemuka ; Pushkara mulaka.

Vern. :—Kûst, kén (B. & H.) ; Osop (Santal) ; Gudárichá-kânda (Bomb.) ; Pinnga, penva (Mar.) ; Bommakachika (Tel.) ; Tsjanakua (Mal.) ; Keyu, Keoli, kûtschiri (U. P.).

Habitat :—Throughout India.

An annual herb. Root-stock tuberous, horizontal. Leafy stem 6-9ft., stout. Leaves $\frac{1}{2}$ -1ft., or more, oblong ; acute, thinly silky beneath. Spike very dense-fid, 2-4in., bracts ovate bright-red, 1-1 $\frac{1}{2}$ in. Calyx lin. ; segments 3, ovate, cuspidate. Corolla-segments white, oblong, 1-1 $\frac{1}{2}$ in. Lip white, suborbicular, 2-3in., the margins incurved and meeting. Filaments 1 $\frac{1}{2}$ -2in., including the oblong petaloid connective. Capsule lin., globose, red, crowned with the persistent calyx.

Uses :—The root is said to be bitter, astringent and digestive, and to be useful in catarrhal fevers, coughs, skin diseases, &c. (U. C. Dutt.) In the U. Provinces, from the root a strengthening tonic is made, and it is also used as an anthelmintic. (Atkinson.) Roxburgh notices a preserve made of the fresh roots which is considered wholesome and nutritious. Ainslie, quoting Brown's History of Jamaica, says that the root is there used as

a substitute for ginger, but is very inferior to it. (*Mat. Ind.* ii, 167.) In the *Calcutta Exhibition Catalogue*, the root is described as depurative and aphrodisiac; similar properties are attributed to it in the Concan, where it is very abundant in most situations. The rhizome resembles the great Galangal in growth and structure, but has no aromatic properties, the taste being mucilaginous and feebly astringent; it could only be used as a substitute for ginger by being preserved with a quantity of that root sufficient to flavour it. (*Pharmacogr. Ind.* III, 427). The root is prescribed by the Santals for pain in the marrow. (Rev. A. Campbell.)

1248. *Elettaria Cardamomum*, *Maton.*, H.F.B.I., VI., 251.

Syn. :—*Alpinia cardamomum*, *Roxb.* 24.

Sans. :—Upakunchika; Ela.

Vern. :—Chhoti-elâchi (H.); Chhoto Elâch (B.); Veldoda (Mar.); Ellakay, aila-cheddi, Ellay (Tam. & Tel.); Yalakki (Kan.); Ellettari, ailum cheddy (Mal.).

Habitat :—Malabar; on the Western Ghats, from Kurg southwards.

Perennial herb, with a horizontal thick root-stock. Stem leafy, 6-9ft. Leaves 1-2ft. by 3in., pubescent beneath. Panicles several to one leafy stem, 1-2ft.; bracts linear-oblong, persistent, 1½-2in. Calyx ½in. Corolla-tube shortly exserted; segments ½in. long. Lip longer than the corolla-segments, white sheathed with violet. Capsule sub-globose or oblong, marked with many fine vertical ribs. Seeds small, black, highly aromatic.

Uses :—The seeds are aromatic, and used as an ingredient in compound preparations.

The seed yields 2·14 per cent. of oil soluble in 4 parts of 70 per cent. alcohol, has a sp. gr.=0·943 at 15°, a rotatory power at 19°=+34°52' (100 mm. tube) and a saponification number=132. The oil contains cineol, a solid terpeneol of rotatory power=+88°31' at 21°, and considerable quantities of alkylic acetates.—*J. Ch. S.* 1899 A. I. 63.

1249. *Alpinia Galanga*, Sw., H.F.B.I., VI., 253.

Sans. :—Dumparástma, kúlinjána.

Vern. :—Kúlanján, bará-kúlanján, Bare vâ malabari-pán-ki-jar (H.); kúlinján (B.); Kolinjan (Guj.); Kosht-kulinján (Mar.); Kunjar, kathi (Sind.); Khúlánjáne-qasbi, khúlanján-e-kabir (Arab.); Khusrave-dârúe-kalán (Pers.); Pera-rattai (Tam.); Pedda-dumpa-rásh-trakam (Tel.); Peraratta (Mal.); Dumpa-rásmi (Kan.); Padagoji (Burm.).

Habitat :—Throughout India.

Root-stock perennial, tuberous, slightly aromatic. Leafy stem 6-7ft. Leaves 1-2ft. by 4-6in., green and glossy on both sides, oblong-lanceolate, glabrous beneath. Panicle copiously compound, (dense-fid) $\frac{1}{2}$ -1ft.; rachis densely pubescent, branches numerous, short; pedicels $\frac{1}{8}$ - $\frac{1}{4}$ in.; bracts small, ovate. Flowers small. Calyx greenish-white, $\frac{1}{4}$ in. oblique at the throat. Corolla-segments $\frac{1}{4}$ - $\frac{1}{2}$ in., linear, oblong, greenish-white. Lip obovate-clawed, emarginate, white-veined, with lilac, $\frac{1}{2}$ in., with a pair of linear, subulate, ascending, reddish glands at the base of the claw. Stamen arcuate, shorter than the lip. Ovules 1-2 in a cell. Fruit orange-red, roundish, about $\frac{1}{2}$ in. diam.

Uses :—The rhizomes of this species are aromatic, pungent, and bitter, and are used in the form of an infusion in fever, rheumatism, and catarrhal affections. As a drug, they are supposed to improve the voice. The aromatic tubers are sometimes used as carminative or fragrant adjunct in complex prescriptions, but they have nothing peculiar in their properties or action. (U. C. Dutt.) How far these properties may have been intended to be attributed to this root-stock or should have rather been given to *A. officinarum*, cannot be accurately determined. The statements of Indian authors have to be accepted for the present, but it seems probable that future enquiry may show that, while both the greater and the lesser galangals are regularly imported into India, as far as their medicinal properties are concerned, the former is only used as substitute for the latter, being commercially less valuable and less active in its therapeutic properties. It is, however,

difficult to determine in many cases to which species authors refer. Dr. Irvine, in his *Medical Topography of Ajmere*, says: "Rhizome of this plant is hot and stimulating; used in *mesalihs*, has a sweet scent; is put into bazar spirits to make it more intoxicating." This habit of flavouring spirits with galangal also prevails in Russia. The seeds also possess similar medicinal properties.

"Hakims use it in impotence, bronchitis, and dyspepsia. It is disinfectant, used to destroy bad smells in the mouth or any other part of the body. It is also advocated in diabetes mellitus." (Asst. Surg. J. N. Dey, Jaipur.) "In Mysore a domestic medicine, much used by old people with bronchial catarrh." (Surg.-Maj. John North.)

The crystalline constituents of Galanga root have been investigated by Jahus, who isolated three compounds, which were termed campheride, galangin, and alpinin. The first-named substance, which has the Empirical formula $C_{16}H_{12}O_6$, crystallises from methylic alcohol in lustrous, golden needles a centimetre in length; it contains 1 mol. of the solvent, which is removed at 100° , and melts at $227-229^\circ$. The triacetyl derivative crystallises from alcohol in pale-yellow needles, and melts at $193-195^\circ$. When the substance is heated with methylic alcohol, potassium hydroxide, and methylic iodide, the dimethoxymethyl derivative is produced, along with two compounds melting at $154-155^\circ$ and $138-140^\circ$ respectively; the dimeth-oxy-methyl derivative crystallises from methylic alcohol in rectangular plates and melts at 178° .—J. Ch. S. 1899 A. I. 537.

The oil, boiled at $170-275^\circ$, had a sp. gr. 0.91 at 20° , a rotatory power— $2.27'$ in a 100 mm. tube, and $n_D^{20} 1.4663$ at 20° . Pinene, cineol, and possibly cadinene are present in the oil; in the fraction $230-24^\circ$, a new hydro-carbon is found, the hydro-chloride of which $C_{15}H_{24}$, 2 HCl, crystallises in leaflets, is optically inactive, and melts at 51° .—J. Ch. S. 1902 A I. 551.

1250. *A. allughas*, *Rosc.*, H.F.B.I., VI., 253.
Roxb. 161.

Vern.:—Taro, taruko (B.).

Habitat:—Throughout India.

Root tuberous, aromatic; stem. 3-6 ft.; leaves very shortly petioled, $1-1\frac{1}{2}$ ft. by 3-6 in., linear-oblong or oblong-lanceolate, acuminate, with usually a twisted cusp, glabrous, base acute, sheath compressed, ligule rounded; panicle erect, decomposed, 6-12 in. long, pubescent or tomentose, lax- or dense-fid., branches short, ascending, with linear deciduous bracts, 4-6 in.

long at the lower forks; flower suberect, shortly pedicelled, 1-1½ in. long; bracts small, cupular; calyx-tube ½-¾ in., sub-campanulate, pubescent, mouth oblique, obtusely 2-3-toothed; corolla-tube as long as the calyx segments, longer than the tube, linear-oblong, cymbiform, dorsally pubescent, shortly spurred below the hooded tip; lip 1 in. long, including the slender claw, cuneiform or nearly orbicular, bifid, margins waved and erose, claw as long as the limb, base with 2 fleshy teeth; filaments nearly as long as the anthers, cells distant, glabrous, connective produced into a small, lobed crest; style glabrous, stigma small; fruit globose, ⅔ in. diam., pericarp black, fragile; seeds small, black. (Trimen.)

Uses:—According to Trimen, the aromatic rhizomes are used as a medicine, probably for the same purposes as other species of this genus.

1251. *A. calcarata*, *Rosc.*, H.F.B.I., VI., 254. Roxb. 169.

Habitat:—Southern Malay Peninsula and the Concan.

Root-stock perennial, not tuberous. Leafy stem slender, 2-4 ft. Leaves 6-12 by 1-2 in., lanceolate, acuminate, green and glossy on both surfaces. Panicle short, dense-fid, 3-4 in.; rachis pubescent; lower branches short, bearing 3-4 crowded flowers; bracts small, ovate. Calyx-tube funnel-shaped, ¼-½ in.; ovary densely pubescent. Corolla segments ½ in., oblong, greenish-white. Lip 1-1½ in., oblong, beautifully variegated with red and yellow on a pale ground with edges slightly incurved; base spurred. Anther-cells minutely margined. Ovules many in a cell. Capsule globose, red. (*Baker*).

Uses:—Sold and used as a substitute for galangal in Hyderabad and other parts of India. (Moodeen Sheriff.)

1252. *Canna indica*, *Linn.*, H.F.B.I., VI., 260. Roxb. 1.

Sans.:—Sarvajayá.

Vern.:—Sarba jaya, Kiáwra, Ukilbar-ki-munker (H.); Sarbajayá, Kámákshi (B.); Hakok (Pb.); Devakeli, kardali (Mar.);

Soogûndaraju gida, kelahú, húdingana (Kan.); Kullvalei-mani, kunda-mani cheddi (Tam.); Krishna-tamarah, guri genza chettu (Tel.); Katávâra (Mal.).

Eng. :—Indian shot.

Habitat :—Cultivated in gardens all over India as ornamental and flowering plants.

Root-stock stout, perennial, tuberous, with many fibres. Stem 3-4ft. Leaves 6-18 by 4-8in., lanceolate to ovate, oval or almost orbicular, caudate-acuminate; veins arching, sheath open above, margins membranous. Lower leaf 1ft. or more. Raceme with a pedicle 1ft. or more, erect; peduncles with a long narrow sheath about the middle; bracts $\frac{1}{2}$ in. oblong, ovate, obtuse, membranous, green. Flowers rather distant 2-2 $\frac{1}{2}$ in. long. Calyx segments $\frac{1}{4}$ - $\frac{1}{2}$ in., lanceolate or oblong, membranous, obtuse. Corolla-segments 1in., erect, narrow, oblanceolate, acuminate, greenish or coloured. Staminal segments longer than the corolla, 3 sub-erect, spathulate, 1 linear, revolute. Fruit erect, $\frac{1}{2}$ -1in. long, sub-globose or oblong, obscurely 3-lobed, crowned with calyx segments, pericarp echinulate, black, thin; seeds very many, pea-sized, globose; testa crustaceous, black, shining. (Trimen and J. G. Baker.)

Uses :—The root is used as a diaphoretic and diuretic in fevers and dropsy (Atkinson), and also given as a demulcent. (Irvine.) It is considered acrid and stimulant. (Fleming.) When cattle have eaten any poisonous grass, which is generally discovered by the swelling of the abdomen, the natives administer to them the stock of this plant, which they break up into small pieces, boil in rice-water with pepper, and give the cattle to drink. (Drury.) The seed is cordial and vulnerary. (Baden-Powell.)

1253. *Musa sapientum*, Linn., H.F.B.I., VI., 262. Roxb. 222.

Sans. :—Kadali; Rambhá. Dirghapatra, Vriṣapuṣpa.

Vern. :—Kelá (H.); Kolá (B.); Kolpaká (As.); Kewiro (Sind.); Mouz, kel (Mar.); Vazhaip pazham, valai (Tam.); Arati,

kadalamu (Tel.) ; Bále ; bále-náru (Kan.) ; Vála, vazhap-pagham, vellacoi, pizang (Mal.).

Habitat :—Cultivated throughout India.

Root-stock stoloniferous. Stem subarborescent of convolute leaf-sheaths, cylindric, erect, 8-12ft. Leaves very stoutly petioled, 4-5ft., oblong, bright-green above, paler beneath ; midrib channelled ; veins horizontal. Spike decurved, usually about 2ft.-3ft., very rarely as long as the leaf, glabrous ; peduncle about 1½ in. diam., below the inflorescence green, glabrous. Bracts large, many-fid, spathiform, bright to dark crimson. Male bracts 6 by 2½ in., ovate, oblong-obtuse ; deciduous ; male flowers very many in each bract, 1½ in. long, nearly white. Calyx tubular, slit to the base in front, 5-toothed teeth, recurved ; 3 outer larger, yellowish-white. Calyx lobes ovate, acute. Corolla a single, convex, membranous petal, opposite the slit of the calyx, embracing the base of the stamens and style. Petal about half as long as the calyx, i.e., ½-¾ in. ; tip rounded ; stamens 5, (rudimentary or 0) ; Anther ¼ in., obtuse, 2-celled. Stigma clavate, tip constricted, truncate. Fruit 4 in. long, obovate-oblong, slightly curved, suddenly constricted at the apex and at the base into a stout pedicel, ¼-½ in., long, obtusely 3-5 angled, golden yellow, sweet, pulpy when ripe. Seedless in cultivated form ; full of many seeds in the wild form. Seeds about ½ in. diam., subglobose, angled by pressure tubereted ; testa brownish-black, crustaceous, rugose, ⅓ in. diam.

Uses :—The unripe fruit, called *mochaka* in Sanskrit, is considered cooling and astringent ; it is much used in diabetes in the form of a *ghrita*, composed of plantain flowers, rootstock, and unripe fruits, *ghi*, cloves, cardamoms, and several other drugs. This medicine is generally prescribed in doses of two *tolas* along with some preparation of tin or other metallic drug. (U. C. Dutt.) Young plantain leaves are used as a cool dressing for blisters, burns, &c., and to retain the moisture of water dressings. They may also be used as a green shade in ophthalmia and other eye diseases. The root and stem are considered tonic, anti-scorbutic, and useful in "disorders of the blood" and venereal disease. Emerson states that the sap forms a valuable

drink and mouth-wash to allay thirst in cholera. According to Dymock, Mir Muhammad Husain states in the *Makhzan*, that the kind of plantain, called *mālbhok*, is used as a poultice to burns, while that called *bolkad* is boiled and employed as an ointment for the syphilitic eruptions of children. He also notices the use of the ashes on account of their alkaline properties, and of the root as an anthelmintic. Ainslie writes, "The plantain is one of the most delicious of all the Indian fruits, and one of the safest for such as have delicate stomachs, being entirely free from acidity; it is, moreover, very nourishing, and is always prescribed as food by the Hindu practitioners for such as suffer from bile and heat of habit."

The fruit has long been known and commented on by European writers. Perhaps the first authentic description is by Pliny, who quotes the name *pala*, a term which still exists in Malabar. He states that the Greeks of Alexander's expedition saw it in India, and that sages reposed beneath its shade and ate its fruit (hence the name "*sapientum*"). In the middle ages, it had some reputation as a medicine. Avicenna wrote that it engendered phlegm, and that it spoiled the stomach, but that it was good for heat in the stomach, lungs and kidneys, and provoked urine. Rhasis stated that the fruit was hurtful to the "maw;" Serapio that it was in the end of the first degree warming, diuretic and aphrodisiac. Paludanus, the commentator and friend of Linschoten, confirms these statements, and, from personal observation, supports the remark that the fruit breeds "a heaviness in the maw." In modern times, it is employed medicinally by Europeans as an anti-scorbutic only, and as a mild, demulcent astringent diet in cases of dysentery, but several other less well-known properties are attributed to different parts of the plant in the following opinions:—

"The ripe fruit of the finer varieties of the plantain is useful in chronic dysentery and diarrhœa. The dried fruit of the larger varieties is a valuable antiscorbutic. In North Bengal, the dried leaves, and in fact the entire plant, is burnt, and the ashes, dissolved in water and strained, yield an alkaline

solution, containing chiefly potash salt, which is used in curries, especially as a cure for acidity, and anti-scorbutic, and where common salt is scarce, this is used by the people for seasoning their curries." (C. T. Peters, M. B., Zandra, South Afghanistan.) "I have known a diet of green plantain well boiled, and curds (*dahi*), sweetened with sugar or seasoned with salt according to taste, to be of singular benefit, in cases of dysentery and diarrhoea. (2) Ripe plantain, well beaten up with pulp of old tamarind and sweetened with old treacle or sugar-candy, is a household remedy among the natives of Bengal for dysentery, at the commencement of the attack. (3) Flour, made out of green plantain, dried in the sun, is used in the form of *chappatis* in certain parts of Tirhoot in cases of dyspepsia with troublesome flatulence and acidity. I have known one case in which it agreed remarkably well when even a diet of plain sago and water brought on a severe attack of colic. The *chappatis* are taken dry with a little salt." (Assistant-Surgeon N. C. Dutt, Durbhanga.) "A combination of ripe plantain, tamarind, and common salt is most efficacious in dysentery. I have used it in many cases both of the acute and chronic forms of the disease, and seldom failed to effect a cure. It may, in fact, be said to be a specific. It is simple, easily procurable, and may safely be administered to a child. In simple cases, a single dose is sufficient, as a rule, three or four doses are required to effect a cure. The patient should be kept quiet and placed on low diet. The dose for an adult is,—ripe plantain one ounce, the pulp of ripe tamarind half an ounce, common salt quarter of an ounce; well mixed and administered immediately. It may be given two or three times a day." (R. A. Parker, M. D.) "The juice of the tender roots contains a large quantity of tannin and is used with mucilage for checking hæmorrhages from the genital and air passages. The ashes, produced by burning the plant, contain a large amount of potash salts, and are used as an antacid in acidity, heart-burn, and colic. The tender fruit is used as a diet for patients suffering from hæmoptysis and diabetes." (J. H. Thornton, B.A., M.B., Monghyr.) "The juice of the bark and leaf is frequently given to children suffering

from an overdose of opium. The juice of an ounce of bark, mixed with an ounce of *ghi*, acts as a brisk purgative." (Surgeon J. McCloghey, Poona.) "The root juice, in which burnt borax and nitre are dissolved, is given with success in ordinary cases of retention of urine. The juice of the flowers, mixed with *curds*, is used in dysentery and menorrhagia." (Native Surgeon T. R. Moodelliar, Chingleput, Madras.) "The juice of the root is used as an antidote to arsenical poisoning in the lower animals. Mixed with *ghi* and sugar and administered internally, it is said to be useful in gonorrhœa." (J. Parker, M.D., Poona.)

Dr. Reginald Ashe, the Superintendent of the Jail at Mymensingh, has lately used with much success in the treatment of diarrhœa and dysentery flour made from the plantain. * * The plantains are cut just before ripening, they are skinned with a sharp wooden knife, so as to avoid blackening, then cut into thin slices, sun-dried, pounded in a mortar and sifted through muslin. The fine powder or flour should be stored in air-tight glass bottles. The issue is 2oz. for each meal cooked in a brass vessel with a little water. *Dahi* or butter-milk can afterwards be added. The taste of the plantain powder is slightly astringent, but fruity and palatable. There is no doubt of the high nutritive value of the plantain. The flour is said to be easily digested. It is well worth trying for patients with chronic bowel complaint who cannot digest milk. I. M. G., July 1900.

N. B.—K. R. Kirtikar once obtained some of this powder from Kanara, but he used it only for congies and not for medicinal purposes. The congy with sugar is very agreeable and easily digestible.

Regarding the use of plantain in Diabetes, see my brochure on Diabetes and its Dietetic Treatment, 8th Edition, 1917, Panini Office, Allahabad. (B. D. B.)

"Plantain leaf is the cleanest and nicest dressing for a blistered surface that I know, and is also useful in covering other dressings. A piece of plantain leaf introduced into the helmet on a hot day forms an effectual protection from the sun's rays, without appreciably adding to the weight of the head-dress." (H. DeTatham, Watt's dictionary.)

The gum obtained from the unripe plantain mixed with rice water is used in diarrhoea. In the Punjab, the sap of the fresh stem is largely used in nervous affections, viz., hysteria, epilepsy, etc. (B. D. Basu.) The ashes of the stem are useful in intestinal worms.

N. O. HAEMODORACEÆ.

1254. *Sansevieria Roxburghiana*, Schult., H.F.B.I., VI., 271.

Syn.—*S. Zeylanica* Willd. Roxb. 294.

Habitat.—Coromandel coast. "I suspect that it is the only species indigenous to India and is confined to the Western Peninsula and Ceylon, wild or cultivated." (J. D. Hooker, in Fl. Br. I. vi. 271.)

Sans. :—Mûrva.

Vern. :—Murahri, Marul (H.); Murba, Gorachakra (B.); Ghanasphan, Marvel (M.); Murvel (Guz.); Mârût Kalang (Tam.); Ishaura-koda-udr (Tel.); Katu-kapel (Mal.); Heggurutike (Kan.).

Root-stock very stout, branching stoloniferous; stem very short; leaves about 8 or 9 in. a tuft, 2½-3 ft. by 1 in. towards the middle, sub-erect, dagger-shaped, rigid, pale-green, with transverse bands of dark green, concave above, and striate, dorsally rounded, ¼ in. thick from back to front, margins thin, reddish, terminated by a terete, acute, rigid, spiniform, green tip, 1-2 in. long. Scape a foot long, cylindric, green or pale-purple, with a few linear, acuminate bracts, 1-2 in., long. Raceme 1-2 ft. long by 1½-2 in. diam., striate, erect, cylindric. Flowers in fascicles of 3-6, sub-erect, very shortly pedicelled, sweet-scented; bracts very minute, ovate, acute, pale-green; perianth pale, greenish-white tinged with violet, tube ½ in., long, cylindric, lobes about as long as the tube, linear-oblong, obtuse, revolute; tips purplish; stamens erect; filaments as long as the perianth lobes; anthers oblong, versatile, ovary trigonous, 3-lobed, lobes pitted at the top; style filiform, exserted; stigma minute. Fruit sparingly produced, globose, ½ in. diam., of one

fertile cell, with 2 minute imperfect cells at the base, dark-orange colour. Seed solitary, broadly ovoid, white; albumin horny.

Uses:—It is described as purgative, heavy, sweet, pungent, tonic, and cardiacal; a remedy for bile, heat of blood, gonorrhœa, tridosha (a corruption of the three humors), thirst, heart disease, itch, leprosy, fever, rheumatism, and glandular enlargements.

Ainslie (Mat. Ind. ii) remarks—

“This fleshy creeping root is, in a slight degree, warm to the taste, and of a not unpleasant odour; and is prescribed, by the native practitioners, in the form of an electuary, in consumptive complaints and coughs of long standing, to the quantity of a small tea-spoonful twice daily. The juice of the tender shoots of the plants they administer to children to clear their throats of viscid phlegm. The plant is cultivated in great abundance at Cumbum, and on the Vursenand Mountains in the Dindigul district.” (Pharmacogr. Ind. Vol. III., p. 493.)

N. O. IRIDEÆ.

1255. *Iris ensata*, Thunb., H.F.B.I., VI., 272.

Vern.:—Irisa, sosun (H.); Tesma (Bhote); Krishûn, unarjal, marjal (Kashmir).

Habitat:—Common on the temperate N.-W Himalaya and Kashmir, in damp places; often grows in gardens.

Root-stock stout, prostrate and creeping. Stems tufted, short, or $1\frac{1}{2}$ -2ft., stout or slender; sheaths fibrous. Leaves 1-2ft. by $\frac{1}{4}$ - $\frac{1}{2}$ in., linear, rigid, grooved, glaucous. Spathes 3-4in., 1-3-fid; valves lanceolate, green. Flowers pedicelled, lilac. Perianth tube 0. Sepals neither crested nor bearded, blade $1\frac{1}{2}$ -2 by $\frac{1}{2}$ - $\frac{3}{4}$ in. rhomboidly ovate, obtuse, entire, shorter than the claw. Petals oblanceolate, erect, $\frac{1}{4}$ in. broad. Ovary 1in., cylindric style; arms 1in. linear; tip acutely 2-fid, crests large, deltoid. Capsule $1\frac{1}{2}$ -3in. by $\frac{1}{2}$ - $\frac{3}{4}$ in., 6-ribbed, beaked, ribs rounded. (J. D. Hooker.)

Use :—It is said to be used medicinally. Further information is required.

1256. *I. nepalensis*, Don. H.F.B.I., VI., 273.

Vern. :—Chalnumdar, sosan, shoti, chiluchi (Pb. and U. P. Himalayan names.)

Habitat :—Western and Eastern Himalaya.

Root-stock stout, prostrate and creeping, with densely fibrous sheaths and copious, fleshy, finger-like roots. Stem $\frac{1}{2}$ -1ft. Leaves linear, 6in. long at flowering time, elongating to 24 by $\frac{1}{2}$ in., streaked with purple lines and dots. Spathes 1-3-fid, $1\frac{1}{2}$ -2in. long, outer valves thin, green, persistent; pedicels very short. Perianth-tube slender, $1\frac{1}{2}$ in., limb $1-1\frac{1}{2}$ in., pale lilac; blade of sepals oblong, half an inch broad, as long as the claw; crests narrow, yellow. Petal oblong, $\frac{1}{2}$ in. broad. Style arms lin. and less; crests large-toothed. Capsule oblong, 3-gonous, with broad, flat sides and a long slender beak, $1-1\frac{1}{2}$ in., enclosed in the persistent spathes (J. D. Hooker.)

Uses :—The root is described as having properties similar to costus, and appears to have been regarded by both Hindus and Arabs as a kind of costus. * * * Iris root is considered by Mahometan hakims to be deobstruent, aperient, diuretic, especially useful in removing bilious obstructions. It is also used externally as an application to small sores and pimples. From the large number of diseases in which this drug is recommended, it would appear to be regarded as a panacea. (Pharmacogr. Ind. III. 452.)

1257. *I. kumaonensis*, Wall., H.F.B.I., VI. 274.

Vern. :—Piáz, karkar, tezma (Pb.).

Habitat :—Temperate and Alpine N.-W. Himalaya.

A dwarf species. Root-stock stout, prostrate and creeping. Stems 2-12in., crowded; outer basal sheaths fibrous. Leaves linear, 12-14 by $\frac{1}{2}$ in. Spathes 2-3in., 1-fid; valves lanceolate, ventricose. Pedicels very short. Flower-heads solitary. Perianth-tube $2-2\frac{1}{2}$ in. long, limb $1\frac{1}{2}$ -2in., bright lilac. Blade of sepals $\frac{1}{2}$ in. broad, spreading, cuneate, obovate, as long as the

bearded claw, blotched with darker lilac; beard of the claw of yellow tipped hairs on a white crest; blade of petals erect, $\frac{1}{2}$ in. broad, oblong. Style arms $\frac{3}{4}$ in. long; crests deltoid, acute. Capsule 1-2 in., ellipsoid or sub-globose beaked, trigonous, angle obtuse. Don describes the sepals as blood-red, with black-purple spots. (J. D. Hooker.)

Use:—In Chumba, the root and the leaves are given in fever. (Stewart.)

1258. *Crocus sativus*, Linn., H.F.B.I., VI., 276.

Sans.:—Kunkuma.

Vern.:—Kesar Jáfrán (B.); Kesar, záfran (H.); Sarfran, keshar, (Bomb.); Kungumapu (Tam.); Kunkum, apave (Tel.);

Habitat:—Cultivated in Kashmir.* Native of the south of Europe. The best saffron comes to Bombay from Spain. J. D. Hooker has the following note:—"The Kashmir saffron is regarded by Royle as a variety of that cultivated in England, distinguished by the very dark violet-blue flowers, yellow anthers and brick-red stigmas, but this accords exactly with the common form, figured by Bentley and Trimen."

* The *Crocus sativus* is the only plant grown in Kashmir the stigmata of which compose hay saffron. The famous saffron fields are situated in the vicinity of Pampur, on a plain fully 50 feet above the valley. The bulbs grow on soil said to have been specially imported for the purpose. In dry seasons the produce averages nearly a ton quantity. Some 1500 lbs. of saffron are exported yearly from Kashmir to Ladakh. The bulbs are planted out in June, and the stigmata are collected in October. It tinges the saliva yellow. Pereira makes one grain of good saffron to contain the stigmata and styles of nine flowers, so that the formation of an ounce would require 4,320 flowers.

The four stations for saffron cultivation, called "Warewas," are flat treeless tablelands, on the borders of the hills, 50 to 150 feet higher than the Kashmir Valley, which is 5,200 feet above the sea-level. They are little, if at all, irrigated. The soil is a stiff clay. Dr. Downes has been informed that saffron has been successfully cultivated in the gardens of the city of Kashmir. He does not think a special soil needed for cultivation of *Crocus sativus*. In a hopeful experiment of this kind at Alwar, near Delhi, Mr. Landseer started bulb-growing on earth brought in barrels from Kashmir. But in the second year the five beds of bulbs had increased to nine, and as there was no further import of Kashmir, earth, native soil had to be used, and with success. In Kashmir the *C. sativus* is cultivated on raised parterres, well drained and carefully weeded, though Dr. Downes believes not irrigated. (Ph. J. 97 1881 p. 9).

A perennial herb, with a root-stock in the form of a sheathed corm. Stem O. Sheaths of corms closely reticulate. Corms large, globular, depressed. Leaves radical, long, slender, grass-like channeled above, white beneath, the edges turned back, fringed, and the lower portion of the leaf-bundle surrounded by sheaths of thin, translucent, whitish tissue. Flowers fragrant, solitary, or in bundles, enclosed in a 2-valved spathe, embracing the scape. Flowers violet, marked with lighter, autumnal, appearing with the leaves. Perianth large, tube very long, slender, funnel-shaped; limb sub-equally 6-lobed, in 2 series; the six segments equal in form and almost in size, but the inner ones are invariably somewhat shorter than the outer, concave, narrow, oblong. Throat of tube bearded. Stamens attached to the base of outer segments, the filaments free; anthers yellow. Ovary hidden between the bases of the leaves, under ground, egg-shaped; style thread-like, branching into 3 style-arms, *i.e.*, stigmas exserted, orange-red, sub-clavate; tips entire or lobulate. (These stigmas constitute the saffron of commerce). Capsule spindle-shaped; seeds roundish (Step and Watson's Favourite Flowers of Gardens and Green-house, Vol. IV, page 553, London 1897).

Uses.—As a medicine, it is used in fevers, melancholia, and enlargement of the liver. It has also stimulant and stomachic properties, is highly thought of as a remedy for catarrhal affections of children, and is used in certain Indian dishes to give them a color. Mullahs (priests) make a kind of ink with this substance with which they write charms. (Dr. Emerson). Formerly regarded as anti-spasmodic and emmenagogue; employed at present chiefly as a coloring and flavouring agent. (Ph. Ind.).

1259. *Belamcanda chinensis*, Leman., H.F.B.I., VI., 277.

Syn. :—*Pardanthus chinensis*, Ker.

Habitat :—Very doubtfully wild in the Himalaya; cultivated all over India; a native of China.

Root-stock creeping, stem erect; leafy. Leaves ensiform;

equitant. Inflorescence branched; sheaths membranous; spathes several-fid, subscarious; bracts scarious; flowers pedicelled. Perianth-tube very short; segments oblong, spreading, subequal. Stamens inserted at the base of perianth; filaments filiform, anthers linear basifixed. Ovary obovoid. Style filiform; arms elongate; tips reniform, stigmatic. Capsule obovoid, membranous, loculicidal; valves reflexed, leaving the seed-bearing axis persistent and free. Seeds subglobose; testa lax, shining, fleshy within. (J. D. Hooker).

Uses:—Loureiro states that the roots are used medicinally in Cochin-China, and that they have aperient and resolvent properties and purify the blood of gross humors, being specially useful in Cynanche. According to Rheede, it is used as an alexipharmic in Malabar, being given to those who have been bitten by the cobra, and to cattle who have fed upon poisonous plants.

N. O. AMARYLLIDÆ.

1260. *Agave americana*, Linn., H.F.B.I., VI., 277; Roxb. 296.

Vern.:—Rakas patta, banskeora, barakanwar, kantala, (Hind.); Jungli or Bilati-ananash, bilatipat, koyan, murga (Beng.); Jangli-kunvara, parkanda (Bomb.); Rakas-patta (Dec.); Anaik-kat razhai, pithakalabuntha (Tam.); Rakashimatalu (Tel.); Wilyatu kaitalu (Pb.); Janglikunvâra (Guz.); Panam-katrâzua (Mal.); Bhuttâle budukattalenaru (Kan.).

Habitat:—Originally a native of America, naturalized in many parts of India.

Leaves lanceolate, many, in a lax rosette, from a short stout prostrate or ascending trunk which is usually hidden by their thick bases, deep green, often variegated with white or pale yellow longitudinal stripes or borders, sometimes rather glaucous; at base spreading, then ascending, tips sometimes recurved, 4 to 6ft. long, and as much as half a foot broad above the middle; sharply constricted just above the base; margins armed with strong dark brown prickles, mostly pointing

downwards, leaf edge between the prickles concavely indented, terminal spine slightly grooved, dull-brown, 1 to 2 in. long derived from the upper leaf margins which for about three inches from the top are involute and horny; scape with the panicle 15 to 25 ft. in height, primary branches of the inflorescence almost horizontal, fascicles of blossoms crowded at the ends of subsidiary ascending branches; germen faintly sulcate, about equalling the perianth or shorter than it, perianth lobes ovate-lanceolate, tips obtuse, amber-coloured as are also the filaments, pollen orange-yellow, style faintly three-lobed, capitate; capsule bluntly trigonous or oblong-cylindrical, rather broader upwards.—(Agricultural Ledger, 1907. No. 7.)

Uses:—The roots are diuretic and anti-syphilitic, and are said to find their way to Europe mixed with Sarsaparilla. (Lindley).

The expressed juice of the leaves is administered by American doctors as a resolvent and alterative, especially in syphilis, scrofula and even cancers.

Diuretic and alterative properties are assigned to its roots by the Mexicans. Dr. Æ. Ross reports having employed them in this character, in decoction (in the proportion of four ounces to one pint of water), in secondary syphilis, with great apparent benefit. Dr. R. F. Hutchinson regards this remedy as well worthy of further trials; he mentions, also, that a thin slice of the large fleshy leaves constitutes a good poultice.

The *sap* is said to be laxative, diuretic and emenagogue. Very useful in scurvy (U. S. Dispens.) Genl. Sheridan is reported to have used the juice with great success amongst his men who were suffering from scurvy, in a small isolated post on the Texas border (Year-book of Phar. 1875; 232). The large, moist, fleshy leaves used with much advantage as poultice; the fresh juice applied to bruises and contusions. The *gum* found exuding from the leaves and lower part of the stem is used in Mexico as a cure for tooth-ache. "The pulp of the leaves placed between folds of muslin and applied to the eye in conjunctivitis; and also used mixed with sugar, in gonorrhœa, twice a day. (H. S. P. Kinsley, Madras).

A vegetable soap was prepared from the leaves which was found as detergent as Castille soap for washing linen, and had the superior quality of uniting and forming a lather with salt water as well as fresh.

The Agave Americana is extensively grown in Mexico for the sake of the juice of the stalk, from which a fermented intoxicating drink called *pulque* is made. The substance yielding the alcohol is a sugar, which may be isolated by the following process:—The juice is first treated with alcohol (2 Vols. 90 per cent.) and filtered; basic lead acetate is next added to the solution, which is again filtered. the excess of lead being subsequently removed from the filtrate by means of hydrogen sulphide; the clear liquid is now evaporated to a syrup under diminished pressure, and left to crystallise in a warm place.

Agavose, $C_{12}H_{22}O_{11}$, is an inactive sugar, which reduces alkaline copper tartrate, and yields a laevogyrate sugar ($[\alpha]_D = -14.43$) on inversion. It is oxidised by nitric acid, but not to mucic acid, and forms a soluble lime compound, which is precipitated by alcohol or by heating.—J. Ch. S. LXIV., pt., I. (1893) p. 64.

1261. *Curculigo orchioides*, Gærtn., H.F.B.I.,
VI. 279. Roxb. 288.

Sans. :—Mushali.

Vern. :—Kālî-mûsli, siyâh mûsli (Hind.); Kālî-mûsli (Guz.); Nilap-tali-gaddalu (Tel.); Nelappanakizhanna (Mal.); Talura (Beng.); Musar Kand (Gond.).

Habitat :—Common in most parts of India.

Root-stock stout, or elongate, with copious, fleshy root-fibres. Leaves sessile, 6-18 by $\frac{1}{2}$ -lin., linear to lanceolate, acuminate, membranous, 5-veined; tips sometimes rooting or reaching the ground, glabrous or softly sparsely hairy; base sheathing; scape very short, clavate, with the pedicels, bracts, and ovary hidden amongst the leaf-sheaths, flattened; raceme subcorymbiform. Flowers bright-yellow, subdistichous, lowest in the raceme perfect, upper male; bracts lanceolate, membranous; perianth produced above the ovary in a filiform, hairy, very slender stripes $1\frac{1}{2}$ -lin. long, which alone with the perianth segments appear above ground; segments $\frac{1}{2}$ - $\frac{2}{3}$ in., long, oblong-ovate, acute, dorsally hairy; stamens small; filaments short; anthers linear; ovary lanceolate; cells 6-8-ovuled; style short. Fruit oblong,

$\frac{1}{2}$ in., hypogaeous, 1-4-seeded; septa spongy. Seeds oblong; testa deeply grooved in wavy lines, black, shining (Trimen).

Trimen further observes thus:—"The long slender beak of the ovary resembles a pedicel or scape, and the raceme and ovary being concealed in the leaf-sheaths, the perianth segments assume the appearance of a whole flower."

Uses:—The tuberous roots are considered alterative, tonic, restorative, and useful in piles, debility and impotence. Also useful in gonorrhœa, dysuria and menorrhagia. (Hindu Mat. Med. Pharm. Ind.)

The roots of this small low-growing plant, common in most parts of India, are described by Ainslie (Mat. Ind., vol. ii., p. 242) as tuberous, wrinkled, about four inches long, having a slightly bitter and mucilaginous taste. How far they constitute a portion of the *Safed Múslí* of the Native Materia Medica (as has been supposed) is undetermined. Dr. Birdwood (Products of Bombay, p. 92) agrees with Dr. Royle in referring this drug to *Murdannia scapifolia*, Royle (Illust., t. 95). Further inquiries are required to determine its botanical source. The roots of *C. orchioides* are held in the highest esteem by the Hindu doctors of Travancore, in gonorrhœa, dysuria, menorrhagia, &c.; and from the unanimous testimony borne by them to their value in these and other allied affections, there is reason for supposing that they exercise some influence on the genito-urinary system generally; but there is no evidence based on European observation as to their value in these cases. (Ph. Ind.)

It is prescribed for asthma, piles, jaundice, diarrhœa, colic and gonorrhœa; it is considered to be demulcent, diuretic, tonic and aphrodisiac, and is often combined with aromatics and bitters. (Dymock.)

Chemical composition.—A proximate analysis of the powdered roots was made with the following results:—

Ether ext. (fat, &c.)	...	...	...	...	1.28
Alcoholic ext. (resin, tannin)	...	...	...	...	4.14
Water ext. (mucilage)	...	...	...	...	19.92
Starch, &c., by difference	...	...	...	...	43.48
Crude fibre	...	...	...	...	14.18
Ash	...	...	...	...	8.60
Moisture	...	...	...	...	8.40
					<hr/>
					100.00

The resin was soluble in spirit and alkaline solutions, and gave a fine red colour with strong sulphuric acid. The tanning gave a green colour with ferric salts, and when determined separately amounted to 4.15 per cent. of the root. Oxalate of calcium was present.—(Pharmacogra. Ind. III. 465.)

1262. *Crinum asiaticum*, Linn., H.F.B.I., VI., 280.

Syn. :—*C. toxicarium*, Roxb. 285.

Sans. :—Vishamandala.

Vern. :—Chindar, kanwal, pindar, kanmu (H.); Nagdamani (Guz.); Nágdavana (Mar.); Naginka-patta (Dec.); Bara-kanur, Nag-daun. bodakanod (Beng.); Vishamungil (Tam.); Kesarchettu, visha mungali, lakshminárayanáchettu (Tel.).

Habitat :—Cultivated in Indian gardens.

Herbs with large coated bulbs. Bulbs 2-3in. diam., narrowed into a neck, 3-12in. high, which is clothed with old leaf-sheaths. Roots from the short root-stock or base of the bulb numerous, vermiform. Leaves 3-5ft. by 5-8in., linear-lanceolate, shortly acuminate, flat, narrowed into the sheathing base, coriaceous, bright-green; margins smooth. Scape from the axils of the old leaves 1½-3ft. up to 1in. diam., compressed, solid, stout; bracts 2, spathiform, 3-4in., long, oblong, acute, papery; bracteoles filiform. Umbel 10-50-fid, somewhat bipartite, with a tuft of bracteoles in the sinus; pedicels ¼-1in. Perianth salver-shaped; perianth tube 3-4in., cylindric, slender, green; segments rather shorter, linear, recurved or revolute; filament very slender, free, spreading, green, shorter than the perianth segments; anthers reddish, ½-¾in. Flowers fragrant at night. Fruit rarely produced, subglobose, 1-2in. diam., 1-rarely 2-seeded, beaked by the fleshy base of the perianth, dehiscing irregularly. (Trimen).

Uses :—The fresh root is officinal in the Pharmacopoeia of India and said to be an "emetic, in small doses nauseant, and diaphoretic, analogous to squill."

[The dried sliced roots are also an efficient emetic, but require to be given in double the dose of the recent article. Sir W. O'Shaughnessy remarks (Bengal Disp., p. 656) that this is the only indigenous and abundant emetic plant, of which he

has experience, which acts without producing griping, purging, or other unpleasant symptoms. In a communication to the Editor, he remarks that it is a good emetic and diaphoretic whenever ipecacuanha is not at hand, but that it should be regarded, not so much as a substitute for that article, as a resource in case of need.]—Ph. Ind.

The leaves bruised and mixed with castor oil useful in whitlows and local inflammations. The juice of the leaves is used in ear-ache. In Java, it is used as an emetic. (Drury).

1263. *C. latifolium*, Linn., H.F.B.I., VI., 283.

Syn.:—*Crinum zeylanicum*, Linn; Roxb. 286.

Vern.:—Sukh-darsan (B. and H.); Gadâmbikanda (Bomb.); Vishamungil (Tam.).

Habitat:—Plentiful throughout the peninsula of India.

Perennial herbs, with large coated bulbs. Bulbs 5-6in. long, globose or ovoid, elongate; neck stout, short. Leaves many, 2½ft. by 3-4in., lorate or oblong-linear, acuminate, flat; margin slightly scabrous. Scape inserted on the neck of the bulb, about as long as the leaves, stout, tinged with purple. Bracts 3-4in., oblong or broadly lanceolate, inner linear. Umbel 10-20-fid; pedicels very short; perianth-tube 3-6in., curved, cylindric, limb nodding, 3-4in. long, funnel-shaped; segments about 3-4 by 1in., oblong-lanceolate, acute. Stamens declinate, about ½ shorter than the perianth segment. Athers ½-¾in. long; style longer than the stamens. Ovary cells 5-6—ovuled. Fruit sub-globose, 1½-2in. diam. Flowers white with purplish or pink stain down centre of perianth-segments. Trimen says this is an extremely variable plant.

Uses:—The bulb is extremely acrid, and is used for blistering cattle, a slice being bound upon the skin. When roasted, it is used as a rubefacient in rheumatism. The juice of the leaf is used in earache.

Rheede states that the crushed and toasted bulb is applied to piles and abscesses to cause suppuration, and that if given to dogs it causes their teeth to fall out. According to Loureiro, it has the properties of squills.

1264. *C. sp.?* (found in Chutia Nagpur).

(Mr. C. B. Clarke writes of this plant that he is unable to name it, and presumes it may be an undescribed species; in that case it should bear the discoverer's name—the Rev. A. Campbell.)

Vern.:—Sikyom baha (Santal).

Habitat:—High and dry situations in Chutia Nagpur, flowering during the hot season before the leaves appear. In some respects, this resembles *C. latifolium* as described in Roxburgh's *Flora Indica*.

Uses:—A decoction prepared from the bulb is given internally and pounded and made into a paste; it is also applied externally by the Santals in dropsy. It is used for the diarrhoea of cattle. (Campbell) Watt ii. 591.

N. O. TACCACEÆ.
1265 *Tacca pinnatifida*, Forst., H.F.B.I., VI., 287.

Habitat:—The Concans, Central India.

Leaves 2-3ft. diam.; tripartite segments 2-3-fid or irregularly pinnatifid or pinnate at the base; petiole 1-3ft., smooth. Scape tapering, longer than the petiole, striped, dark and light-green, 10-40-fid. Flowers drooping; involucre leaves 4-12 or more, subequal, oblong, acuminate, lanceolate, recurved, striped with purple; filiform bracts very numerous. Perianth greenish, subglobose, $\frac{3}{4}$ in. diam., fleshy; lobes conniving, subequal, margined with purple. Fruit size of a pigeon's egg, 6-ribbed, yellow. Root-stock globose, 1ft. diam., under cultivation. (Hooker). Seeds angular. (Trimen.)

Uses:—The root-stock is intensely bitter when raw. It is full of starch, which, when prepared, is of excellent culinary properties, and is far preferable to that of any other arrowroot for dysentery.

N. O. DIOSCOREACEÆ.

1266. *Dioscorea pentaphylla*, Linn., H.F.B.I., VI. 289.

Vern.:—Mándá (Mar.); Ts-iagri-nuren (Mal.); Shendurvel (Bomb.); Padimuskir (Gond); Pandigada (Tel.).

Habitat:—Throughout tropical India.

Herbs, with large tuberous root-stocks. Root tubers 5-6ft. long. Stem slender, glabrous, more or less prickly, especially towards the base, often tuberiferous in the leaf axils. Leaves alternate, 3-5-foliolate glabrous, or sparsely pubescent beneath. Petiole, 1-4in.; leaflets 2-6in., shortly petiolate, oval, obovate or lanceolate, acuminate, cuspidate or subcaudate, membranous; base acute, lateral oblique at the base. Male flowers in very slender racemes, 1½in. long, which are solitary or binate on a very slender, flexuous tomentose rhachis, 6-12in. long. Bracts very broad, apiculate, membranous, much shorter than the flowers. Perianth about ½in. diam.; segments glabrous or sparsely pubescent, broadly ovate, obtuse. Stamens 3; anthers subsessile; staminodes 3, minute; pistillode 3-lobed. Female flowers in axillary, flexuous, pendulous, tomentose spikes, 2-6in. long. Perianth segments broader than in the male. Staminodes 3, minute. Stigmas spreading, linear; fruit ¾-lin. long, quadrately oblong, retuse at both ends, glabrous; seeds ½in. long, wing terminal, longer and broader than the short, oblique nucleus. Flowers pale greenish, fragrant tubers edible. (Trimen).

Uses:—The tubers are sometimes used to disperse swellings. (Dymock.) Also used as a tonic.

1267. *D. oppositifolia*, Linn., H.F.B.I., VI., 292; Roxb. 730.

Vern.:—Már-páspoli (Bomb.); Piska (Santali); Aretige, tegálu, avatenga tige (Tel.); Girs konda, sut konda (Gond).

Habitat:—Tropical India, from Assam, Silhet and Chittagong, southwards to Ceylon.

Root-stock short, with many long cylindric tortuous roots as thick as a swan's quill; stem slender, unarmed, not tuberiferous, terete, pubescent or tomentose; leaves opposite rarely alternate 3-5 by 1-3 in., polymorphous, from lanceolate to oblong-oval or orbicular, obtusely acuminate or rounded at both ends, coriaceous, 3-5-veined, margins cartilaginous, sparsely hairy on both surfaces, petiole $\frac{1}{4}$ - $\frac{1}{2}$ in.; male spikes $\frac{1}{4}$ - $\frac{3}{4}$ in., alternate or whorled on a long filiform tomentose pendulous rhachis 4-10 in. long; flowers pale-greenish, crowded, sessile by a broad base, nearly glabrous, about $\frac{1}{20}$ to $\frac{1}{12}$ in. broad; bract small, ovate, acuminate, membranous; outer perianth-segment broadly ovate or orbicular, concave, inner smaller, obovate; stamens 6, filament short, anther didymous; pistillode obscure; flower female distant on axillary, pendulous, tomentose spikes 6-8 in. long, bracts minute; perianth-segments orbicular, glabrous or pubescent; staminodes 6, minute; stigmas linear, 2-fid; fruit orbicular or broader than long, $1\frac{1}{2}$ - $2\frac{1}{2}$ in. diam., glabrous, top retuse or almost 2-lobed, base cuneate, carpels $\frac{1}{2}$ -circular; seeds orbicular, $\frac{3}{4}$ - $1\frac{1}{4}$ in. diam., wing very broad all round. (Trimen).

Uses:—The root, ground and heated, is applied to reduce swellings; it is also used in snake-bite and scorpion sting.

1268. *D. sativa*, Linn., H.F.B.I., VI., 295.

Vern.:—Rátalu (H.); Ato sang (Santali); Chiná, gordikaunphal (Bomb.); Gorkand, gorádu (Mar.); Zamskollung (Guz.); Heggenasu (Kan.).

Habitat:—Cultivated over the greater part of India.

An extensively climbing herb. Root-tubers very large, globose or elongate; stem terete, unarmed, glabrous, tuberiferous in the leaf-axils. Leaves opposite and alternate, 3-14 in. long and broad, broadly ovate, cordate, sometimes broader than long, acuminate, cuspidate or caudate, 7-9-veined, glabrous, membranous; basal sinus broad, deep or shallow; petiole 2-6 in. Male-spikes 1-4 in., filiform, crowded or scattered on the branches of crowded axillary, slender, pendulous, glabrous spikes or panicles up to 12 in. long, green or purplish. Flowers yellowish-white, solitary, sessile by a

broad base; bracts ovate, acuminate; perianth-segments sub-valvate, fleshy, outer $\frac{1}{2}$ in. long, lanceolate, inner rather smaller and narrower; stamens 6; filaments much shorter than the segments. Anthers minute, didynamous, pistillode, 3-lobed; female spikes axillary, solitary or fascicled, 4-10 in. long, pendulous; flowers sessile, $\frac{1}{2}$ in., glabrous; perianth-segments as in the male. Staminodes 6, ovary, with 2 minute, ovate, acuminate bracts at the base; style short, conical; stigmas 3, very short, recurved. Fruit $\frac{3}{4}$ -1 in. long, by $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, quadrately oblong, rather broader upwards; top truncate or abruptly acute; base truncate or subcordate. Seeds winged at the lower end only; wing twice as long as the nucleus. (Trimen.)

Use :—In the form of a powder, the root is used as an external application for ulcers.

1269. *D. bulbifera*, Linn., H.F.B.I., VI., 296.

Vern. :—Zamin kand (H.); Piska (Santali); Kárandâ (Bomb.); Kau-karinda (Dec.); Kuru kanda (Chanda); Kathálu, patni-alu, mati-alu (Assam); Malaka-kaya-penda lam, chedu paddu dumpa (Tel.).

Habitat :—Sylhet, Chittagong and throughout the Western Ghats of Bombay.

It is a distinct species, the capsule being longer than broad, and the seeds winged at the base only; the leaves are bright, shining, green; and the transverse nerves rest within channels. The tubers are round, not larger than a man's fist. The stem bears numerous little tubers by which the plant may be propagated. The aerial tubers also afford characters by which the varieties may be separately recognised. (Watt's Commercial Products of India, p. 493).

Uses :—The tubers are applied to ulcers after being dried and powdered. In the plains of the Punjab, the leaves are used medicinally and sold under the name of *tatar puttr*. Baillon alludes to the known febrifugal property of the leaves of certain species of *Dioscorea*, rendering them useful in the treatment of intermittent fevers. The flower spikes long, white, tender, and beautiful (female) are cooked and eaten as a savoury vegetable in the Thana district. (K. R. Kirtikar.)

N. O. LILLIACEÆ.

1270. *Smilax glabra*, Roxb., H.F.B.I., VI., 302 ; Roxb. 725.

Vern. :—Badi chobchini (H.) ; Hariná-shuk-china (B.) ; Hazina (Garo).

Habitat :—Eastern Bengal ; Sylhet, and the Garo and Khasi hills.

The long, white, tender and beautiful flower spikes. Females are cooked and eaten as a savoury vegetable in the Thana district. (K. R. Kirtikar.)

Climbing, straggling shrubs. Branchlets slender, terete, smooth, unarmed. Leaves, alternate, 3-6 by $1\frac{1}{4}$ - $2\frac{1}{4}$ in., elliptic or ovate-lanceolate, acuminate, 3-costate to the rounded or cuneate base, rather thin, petiole, $\frac{1}{2}$ - $\frac{2}{3}$ in., narrowly sheathing, unarmed ; cirrhi very slender ; sheath $\frac{1}{3}$ - $\frac{2}{3}$ in., long, axillary. Umbels many-fid ; peduncle ebracteate ; pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in., bracteoles subulate. Flowers very small, white ; buds depressed—globose, deeply 6-lobed from the groove on the back of the obovate, cucullate, coriaceous sepals ; petals minute ; stamens very short ; staminodes in female flowers 3. The roots are nodose. (J. D. Hooker.)

Uses :—A decoction of the fresh root is used by the hill tribes of Assam for the cure of sores and venereal complaints (Watt.)

1271. *S. lanceaefolia*, Roxb. H.F.B.I., VI. 308. Roxb. 725.

Vern. :—Hindi chobchini (H.) ; Gutea-shuk-china (B.).

Habitat :—Eastern Himalaya, from Sikkim to Bhutan ; the Khasia hills ; Naga-hills and Manipur.

A climbing shrub. Branches slender, sub-terete ; prickles few or 0. Leaves 4-6 by $1\frac{1}{2}$ -3 in., orbicular-oblong or oblong-lanceolate, acuminate, 3-costate ; base acute, membranous, subcaudate, intra-marginal nerves very slender, punctulate, and lineolate. Petiole $\frac{1}{2}$ - $\frac{3}{4}$ in., sheath, obscure. Male umbel, subsessile, 15-25-fid pedicels $\frac{1}{2}$ in., filiform ; bracteoles ovate, acute. Flowers $\frac{1}{4}$ in. diam., peduncles, naked, shorter than the petioles. Sepals and

petals linear, sub-equal; anthers oblong, much shorter than the filaments. Female umbels sub-similar. Peduncles stout, flattened; bracteoles very minute, subulate or 0. Staminodes 3, ovary short, obtusely trigonous; stigmas short, obtuse, recurved. Berry about $\frac{1}{4}$ in. diam.

Uses.:—The large tuberous roots are so like those of *S. China*, *Linn.*, as not to be distinguished by the eye. The juice of the fresh root is taken inwardly for the cure of rheumatic pains, and the refuse, after extracting the juice, applied to the affected parts. (Roxburgh.)

1272. *S. macrophylla*, *Roxb.* H.F.B.I., VI. 310. *Roxb.* 725.

Vern..:—Jangli-aushbah, Chobchini (H.); Kumárika (B.); Atkir (Santal); Chopchini (Nepal); Guti, gútweel, gholyel (Mar.); Malait-támara (Tam.); Konda dontena, konda támara, konda gurava tige, sitapu, chettu, kistapa, tamara, kummara baddu (Tel.); Kal-támara (Malay.).

Habitat.:—Tropical Himalaya, from Kumaon eastward, Assam, Bengal, Chittagong, Burma, the Central Provinces and Konkan. Fairly common in the Sal Forests of the Siwalik Division, (Kanjilal).

A large, thickly climber. Stem sometimes exceeding lin. diam., stout, terete. Leaves ovate or orbicular, 6-18 in. long, thinly coriaceous, cuspidate, shining above; nerves 5-7, from the rounded or sub-cordate base, cirrhi long. Petiole stout, 1-1½ in. long, the lower half narrowed and sheathing. Male peduncles $\frac{1}{2}$ -1½ in., slender. Umbels many-fid, 2-3, many flowered. Pedicels not exceeding $\frac{1}{8}$ in., stout in fruit. Sepals $\frac{1}{2}$ in. long, linear. Stamens as long as the sepals. Staminodes of females 3, ovary oblong; stigmas 3 sessile. Berries $\frac{1}{2}$ -1½ in. round, 1-2-seeded. Seeds biconvex.

Uses.:—In some parts of India, the roots are used as a substitute for sarsaparilla in the treatment of venereal disease. Among the Santals, they are applied for rheumatism and pains in the lower extremities. The inhabitants of Nepal give them in doses of three *máshas*, for the treatment of gonorrhœa and other discharges from mucous membranes. (Watt.)

1273. *Asparagus filicinus*, Ham. H.F.B.I., VI., 314.

Vern. :—(Pb.).

Habitat :—Temperate and Tropical Himalaya, from Kashmir to Bhutan. The Khasia hills. Jaunsar, Burma.

A tall, erect, unarmed shrub, having tuberous roots. Stems flexuous, fistular, much branched, smooth; lower branches spreading; upper internodes short. Cladodes 2-5-nate, falcate, flat, acuminate, costate, $\frac{1}{10}$ - $\frac{1}{4}$ in. Pedicels solitary or 2-nate, $\frac{1}{4}$ - $\frac{1}{2}$ in., jointed above the middle, very slender. Flowers white, scarcely $\frac{1}{10}$ in. diam.; solitary or in pairs, polygamous. Perianth $\frac{1}{12}$ - $\frac{1}{10}$ in., sub-campanulate; stamens short; anthers minute. Berry $\frac{1}{4}$ - $\frac{1}{2}$ in. diam.

Uses :—The root is considered tonic and astringent. In Kanáwár a sprig of this is put in the hands of small-pox patients as a curative measure. (Stewart.)

1274. *A. racemosus*, Willd., H.F.B.I., VI., 316; Roxb. 291.

Sans. :—Shatamúli (S. and B.).

Vern. :—Shakákúl (H.); Satáwar, bozandán, bozidán (Pb.); Shaquaql-e-misri (Duk.); Satávari (Guj.); Satávari-mul. (Mar.); Tannir-muttan-kizhangu, skimai-shadavari (Tam.); Khalla-gaddu, pilli-pichara (fresh-root); sima-shata-vari (dry root) (Tel.); Shatawali (Mal.); Majjige-gadde (Kan.).

Habitat :—Found all over India.

A tall, rambling and scandent, spinous, excessively branched undershrub, root-stock tuberous. Branches triquetrous; spines $\frac{1}{4}$ - $\frac{1}{2}$ in., straight or sub-recurved. Cladodes 2-6-nate, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, $\frac{1}{10}$ in. broad, in the middle, acicular, trigonous, falcate, finely acuminate at both ends. Raceme 1-2 in., many-fid, solitary or fascicled, simple, rarely branched; pedicels very slender, $\frac{1}{8}$ in., joined at or above the middle. Perianth white, fragrant, $\frac{1}{12}$ - $\frac{1}{10}$ in. across; segments oblong, obtuse; anthers small, shortly oblong, purplish. Ovary-cells ovuled. Berry 1-2 seeded, globose or didymous, $\frac{1}{8}$ - $\frac{1}{4}$ in. diam. Very variable in length of leaves and spines. (Trimen).

Uses :—The root of this plant is used medicinally as a refrigerant, demulcent, diuretic, aphrodisiac, antispasmodic, alterative, anti-diarrhoeatic and anti-dysenteric. It is used chiefly as a demulcent in veterinary medicine. Baden-Powell says that it prevents confluence of small-pox. The root is used in impotence in the form of a preserve. Tuberous roots pickled; shoots eaten as vegetable. (Kanjilal).

Chem. comp.—The powdered roots were separated into—

Water extract	...	...	...	...	52.43
Crude fibre	...	...	...	...	33.65
Moisture	...	...	...	...	9.46
Ash	...	...	...	...	4.46
					<hr/>
					100.00
					<hr/>

The amount of saccharine matter, estimated as glucose, in the water extract was 7.14 per cent. Some of this extract was boiled and filtered and evaporated down to a soft consistence and allowed to remain for three months under a bell jar. At the end of that time no crystalline substances had formed, indicating the probable absence of crystalline sugars, mannite, and asparagin.

1275. *A. adscendens*, Roxb., H.F.B.I., VI., 317; Roxb. 291.

Vern. :—Suféd músli, satávar (H.); Khairuwa (N.-W. P.); Sápgheta musali, dholi musali (Bomb.); Dholi musali, saphéd-musli, ujli-musli (Guj.); Saféda-musali (Mar.).

Habitat :—The Western Himalaya, in the Punjab, from Murree eastward to Kumaon, the Dieu and Sal forests.

A sub-erect shrub, with stout terete stem and grooved, rough angled, ascending branchlets; spines $\frac{1}{2}$ – $\frac{3}{4}$ in. straight. Cladodes 6–20-nate, $\frac{1}{2}$ – $\frac{2}{3}$ in., slender, filiform, soft, terete, suberect or curved. Racemes many-fid, 1–3 in. long, copious, often bearing cladodes at tip of branches of racemes. Pedicels $\frac{1}{2}$ – $\frac{1}{4}$ in., jointed above or below the middle. Flowers white, $\frac{1}{4}$ in. diam. Bracts minute. Perianth segments spreading; anthers medium-sized. Ovules many in each cell. Berries $\frac{1}{4}$ – $\frac{1}{2}$ in. diam., 1-seeded.

Uses :—The tuberous roots used as demulcent and tonic and as a substitute for *Salep* Tonic, demulcent. Said to be useful in diarrhoea, dysentery and general debility.

Chem. comp.—The powdered roots were found to contain—

Water extract	...	...	...	...	77.55
Cellulose	..	...	...	...	12.85
Moisture	...	...	...	...	6.00
Ash	...	...	...	...	3.60
					<hr/>
					100.00

The water extract was a thick mucilaginous liquid which threw out white flocks of albuminous matter when boiled, and was not affected by Fehling's solution. The portion of the root insoluble in water consisted of almost pure cellulose. (*Pharmacogr. Ind.* III. 485.)

1276. *A. gonoclados*, Baker, H.F.B.I., VI., 318.

Vern. :—Satamúli (B.); Hatmuli (Assam); Tilora (Sind); Shatávári (Bomb. and Guz.); Satávári-múl, zatar (Mar.); Kilávári, tannir-vittán-kizhangu, tanni-muttán-kalangu (Tam.); challagaddalu, pilli-pichara (Tel.); Shatávári-kizhanna, shatávali (Mala); Majjige-gadde (Kan.); Shaqáqul or shakakúl (Arab., Pers., and Hin.). This is erroneously called *Safed musli* in some parts of India.

Habitat :—Upper India, Concan and the Deccan.

An excessively branched, subscandent, armed under-shrub; stem terete; branches curved, green, triquetrous. Spines short. Cladodes 2-6-nate, 1-1½ in. long, by ½ in. broad, flat, straight or falcate, subcostate, narrowed to the acuminate base and tip; racemes 1-3 in., often fascicled, sometimes connate; pedicels ½-1½ in. jointed much below the middle, bracts as long as the lower joint of the pedicels, cymbiform; perianth ½-1 in. across; segments spreading, outer linear-oblong, inner more spatulate; anthers much shorter than the filaments. Berry globose, ½ in. diam., or didymous and twice as broad. Flowers white.

Uses :—The root is considered nourishing and aphrodisiac. Boiled with oil, it is applied to cutaneous diseases. It is given in gonorrhœa in 15 grains per dose. The root is used to adulterate or as substitute for *Aconitum heterophyllum*. (Watt.)

1277. *Polygonatum multiflorum*, All., H.F.B.I., VI., 319.

Habitat :—Western Temperate Himalaya, from Kashmir to Kumaon.

Herbs, glabrous or nearly so. Root-stock creeping; stems 2-3ft., round, arching. Leaves alternate oblong, ovate, $3\frac{1}{2}$ -4in. by $1\frac{1}{2}$ in., nearly sessile, pointed, sub-bifarious or secund, oblong, by lower surface glaucous, sub-acute. Peduncles 1-5-fid., $\frac{1}{2}$ - $\frac{1}{4}$ in. Racemes solitary, axillary, 2-5 flowered. Perianth $1\frac{1}{4}$ in.; tube white; lobes green, constricted in the middle; nerves within hairy. Filaments puberulous, inserted above the middle of the tube. Berry globose, $\frac{1}{2}$ in. diam., blue, black. Seeds few.

Uses:—The rhizomes are used in Europe as a popular remedy for removing bruises, and discoloration of the skin resulting from blows.

1278. *Asphodelus tenuifolius*, Cavan., H.F.B.I., VI., 332.

Vern.:—Piázi, bokát (Pb.); Binghar-bij (seed) (Pb.)

Habitat:—Abundant as field weed in most parts of the plains of India, from Bengal westward to Gujrat and the Punjab.

An erect, glabrous, annual herb. Leaves radical, linear, 6-12in., slender, terete, fistular, erect, acuminate, $\frac{1}{2}$ in. diam. Scape smooth or papillosely scaberulous, 6-24in., often much branched. Pedicels jointed below the middle, $\frac{1}{2}$ - $\frac{1}{4}$ in. Flowers bracteate, racemed. Perianth 6-parted, $\frac{1}{2}$ in. long. Segments white, with a red-brownish costa, spreading. Stamens 6, hypogynous, filaments fusiform towards the tip, with bases dilated, concave, closely covering the ovary. Ovary 3-celled; style straight. Stigma 3-lobed, terminal. Ovules 2 in each cell. Capsule globose, $\frac{1}{2}$ in. diam., horizontally wrinkled. Seeds usually 3, 3-sided. J. D. Hooker remarks: "Wight's figure is very incorrect as regards the filaments; he is unable to give any locality for the specimen figured, which, he supposes is from the sandy soils of the East Coast of the Deccan."

Uses:—The seed is officinal at Lahore. It is said to be diuretic.

1279. *Chlorophytum arundinaceum*, Baker., H.F.B.I., VI., 333.

Vern.:—Saféd musli (H.); Ganjagata (Gond).

Habitat :—Eastern Himalaya, Sikkim, Bhotan, Assam, Behar at Monghyr, on Parasnath. Central Provinces, frequent, especially on the plateau land in Balaghat and Bilaspur.

Root fibres cylindric. Leaves 6-18 by $1\frac{1}{2}$ -2in., oblanceolate, obtuse, acute or acuminate, usually narrowed into a broad petiole. Scape 6-20in., stout, naked; raceme 3-8in., elongate, simple or shortly branched; bracts $\frac{3}{4}$ - $\frac{1}{2}$ in. or lower, longer; pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in. jointed in the middle. Perianth-segments $\frac{1}{2}$ - $\frac{1}{3}$ in., lanceolate, white. Anthers longer than the filaments. Capsule $\frac{1}{2}$ in. broad, 2-lobed at the tip and base; cells 3-4 seeded. Seeds $\frac{3}{8}$ in. diam.; sub-orbicular, flat, black. In small specimens, the leaves are narrower and broadest at the base. (Hooker.)

Uses :—Safed musli appears in the market in white dry pieces '5-2-5" long and '25" thick. They swell in water to a cylindrical fusiform shape, and are said to be used (like Kâlâ Musali) as a tonic. (Haines.)

N.-B.—No other writer, except Mr. H. H. Haines, I.F.S. considers *Safed musli* to be the product of this plant (Indian Forester, Vol. XL (1914), p. 477.) B. D. B.

Genus *Allium*, Linn. strong smelling, scapigrous herbs. J. D. Hooker calls them "fetid." Well he may. A congener *A. ascalonicum* is surnamed *A. fragrans* g. *nepalensis*. I don't call them fetid. Of course opinions differ. They are, no doubt, strong smelling, some with ammonical odours. (K.R.K.) Bulbs coated. Leaves usually narrow, often fistular. Flowers capitate or umbelled, all at first enclosed in 1-3 membranous spathes, stellate or campanulate; sepals free or connate below. Stamens hypogynous or inserted on the perianth; filaments free or connate below, anthers oblong. Ovary 3-gonous, 3-celled. Style filiform; stigma minute; cells few-ovuled. Capsule small, loculicidal. Seeds few, compressed; testa black.

1280. *Allium ascalonicum*, Linn., H.F.B.I., VI., 337. Roxb. 288.

Vern. :—Ek-kanda-lasun or ek-kali-lasan (one-clove garlic)

Eng. :—The Shallot.

Habitat :—Extensively cultivated in India during the latter part of the rains.

Root biennial, or more, consisting of a fascicle of several ovate, oblong bulbs, generally (as found in the markets) about as large as the first joint of the middle finger. Leaves somewhat bifarious, fistulous, more than semi-cylindrical, tapering, pointed, compressed toward the apex, smooth and shorter than the scapes. Scapes rising from the centre of the short stem formed by the united sheathes of the leaves, naked, round, smooth, slightly swelled towards the base and from thence tapering to the umbel, from one to two feet long. Sheaths shorter than the umbel, irregularly bursting into two or three sub-ovate segments. Umbels globular, as much as two-hundred-flowered. Flowers like those of the common onion (*Allium cepa*). Petals equal, expanding, shorter than the stamens, white, with a green keel. Filaments erect, alternately dilated at the base. Anthers ovate, green. (Roxburgh.)

Uses :—It is used to cure earache, a small piece being placed in the meatus. It is also fried in butter and preserved in honey as an aphrodisiac. (Pharmacogra. Ind., Vol., III. p. 492).

1281. *A. Cepa*, Linn., H.F.B.I., VI., 337 ; Roxb. 287.

Sans. :—Palandu.

Vern. :—Piyáz (H. B. and Pb.) ; Dungari (Guz. and Sind.) ; Kanda (Mar.) ; Vella-Vengazam, irulli, ira-vengay-am (Tam.) ; Vulli-gaddalu, niruli (Tel.) ; Vengazam, nirulli, kumbali (Kan.) ; Bawang (Mal.).

Habitat :—Cultivated all over India.

Leaves fistular, sub-distichous, shorter than the inflated scape. Heads dense with flowers and bulbils. Pedicels shorter than the stellate flowers ; sepals linear-oblong ; filaments exserted, simple, or the inner 2-toothed at base.

Uses :—The bulbs contain an acrid, volatile oil, which acts as a stimulant, diuretic, and expectorant. Onions are occasionally used in fever, dropsy and catarrh, and chronic bronchitis ; in colic

and scurvy. Externally as rubefacient, and, when roasted, as a poultice. Considered by natives hot and pungent, useful in flatulency. Said to prevent the approach of snakes and venomous reptiles. (Baden-Powell.)

They are also described as aphrodisiac. Eaten raw they are emmenagogue. The juice rubbed on insect-bites is said to allay irritation. The centre portion of a bulb, heated and put into the ear, is good for ear-ache. The warm juice of the fresh bulb is also used for this purpose.

The seeds yield a colourless clear oil used in medicine.

Onion tea will often relieve sleepless and irritable children when opium and other narcotics have failed. Let the opium go, and try onions first.—Family Doctor, June 19, 1886.

The expressed juice of the bulbs, with salt dropped in the eye, is said to be useful in night blindness. A poultice of bulb is also used. (B. D. B.).

"The bulb is crushed and the acrid smell is utilised emitted like smelling-salts for fainting and hysterical fits." (S. M. Robb, Ahmedabad). "Said to increase the peristaltic action of the intestines, and is prescribed in obstruction. Used in jaundice, hæmorrhoids, and prolapsus ani, also in hydrophobia. As an external application, onions are used in scorpion bites and to allay irritation in skin diseases. They have antiperiodic properties attributed to them, and are said to mitigate cough in phthisis, and mixed with vinegar, used in sore-throat." (Surg. J. McConaghey, Shahnjahanpore.) Used as a decoction in cough." (Surg. Ross, Delhi). Onion juice, mixed with mustard oil in proportion, is used as a liniment to allay rheumatic pains. (Watt's Dictionary).

Onions yield 0.005 per cent. of their weight of a dark-brown essential oil which does not contain oxygen, has a sp-gr. at 87°=1.041, and exhibits a rotation of 5° in a 100 mm. tube; a small quantity of crystals separate on cooling it in a freezing mixture. As it decomposes when distilled at the ordinary pressure, it was fractionated under a pressure of 10 mm.

The main portion of the oil consists of a compound, $C_6H_{12}S_2$ an oil of sp. gr. 1.0234 at 12°, which boils at 75-85° (10 mm.), and is converted into the compound $C_6H_{12}S_2$ on treatment with potassium; this new compound boils at 68-69° (10 mm.), and seems to be present in small quantity in the original oil. The compound $C_6H_{12}S_2$ is converted by zinc-dust into a mono-sulphide, $C_6H_{12}S$.

(C-p. 133°). A small quantity of a substance was isolated from the fractions boiling above 100° (10 mm.), and appears to be identical with one of the compounds obtained from oil of asafœtida. The residue boiling above 126° (10 mm.) contains a higher sulphide, and gives the compound $C_6H_{12}S_2$ on reduction with zinc-dust. Neither allyle sulphide, nor a sesquiterpene were present.—J. Ch. S. LXIV. pt. I (1893) p. 104.

The outer skins of the bulb of the onion contain a yellow colouring matter (Quercetin) of which the formula is $C_{15}H_{10}O_7$.

1282. *A. sativum*, Linn., H.F.B.I., VI., 337; Roxb. 287.

Sans. :—Lasuna; Mahaushada.

Vern. :—Lassun (H.); Rasun (B.); Naharu (Ass.); Lasun (Mar.); Shunam (Dec.); Vallai-pundu (Tam.); Velluli-tallagadda (Tel.); Belluli (Kan.); Gokpas (Bhote). The best kind sold in Bombay is called "Goghari Lusoon. (K. R. K.)

Habitat :—Cultivated much in the U. P., especially in Garhwal, and Kumaon. Also in the Panjab and Kashmir. In the Western Peninsula.

A perennial herb. The true stem, which is much reduced, gives off roots from the base, and supports, as cauline appendages, the overlapping scales (old leaf bases), which were thickened below and bear, in their axils, small bulbs or cloves. These closely imbricating scales, together with the cloves and the reduced stem, form the bulb. The leaves are flat. The slender flowering stem, or scape, emerges from the centre of the bulb, and bears a few flowers in umbels, the majority being replaced by diminutive bulbs or bulbils. (Duthie.) Spathes long-beaked. Sepals lanceolate, acuminate. Stamens 3-pointed. (Roxb.) Inner filaments 2-toothed.

Uses :—Garlic is considered hot and aperient; given in fevers, coughs, piles, leprosy, being regarded as carminative, diuretic, stomachic, alterative, emenagogue and tonic, and much used in nervous affections. Externally, the juice is applied to the ears for deafness and pain. The oil extracted from the seed is also medicinal. The cloves of the bulb are given in confection for rheumatism. The properties of garlic depend upon a volatile oil which may readily be obtained by

distilling the bruised bulbs. When purified, this oil is colourless, and may be distilled without decomposition. When garlic has been eaten, the odour of this oil may be detected in the various secretions of the body. Regarded by some as an anthelmintic.

Mixed with vinegar it is used as an astringent in relaxed sore-throat and relaxation of the vocal cords. It is also used in asthma, general paralysis, facial paralysis, gout and sciatica, much thought of in the treatment of flatulent colic. Supposed to prevent the hair turning grey when applied externally. (Dr. Emerson.) It is resolvent in indolent tumors. Is largely used as a liniment in infantile convulsions and other nervous and spasmodic affections. It is also frequently used as a poultice in retention of urine from debility of the bladder.

Garlics were found to yield 0.09 per cent. of their weight of a yellow-coloured, optically inactive, essential oil, which has the well-known intense odour; its sp. gr. at 14.5° is 1.0525. It deposits a small quantity of crystals when cooled in a freezing mixture, does not contain oxygen, and decomposes when heated at 150°. The oil was fractionally distilled under a pressure of 16 mm.

Fraction 1 (6 per cent.) consists of *allylpropyl bisulphide*, $C_3H_5S.S.Pr.$, a bright-yellow oil of sp. gr. 1.0231 at 15°, boiling at 66-69° (16 mm.), and having the odour of onions; it gives voluminous precipitates with mercuric and auric chlorides, which are sparingly soluble in alcohol, and when treated with zinc-dust at 130°, yields a compound, $C_6H_{12}S$. It is decomposed by oxidising agents with the production of carbonic anhydride, oxalic acid, propionic and lower fatty acids, and sulphuric acid.

Fraction 2 (60 per cent.) is *diallyl bisulphide*, $S_2(C_3H_5)_2$, a light-yellow oil, having the odour of garlic; it is rendered colourless by distilling with a little potassium when it passes over at 78-80° (16 mm.). It has a sp. gr. at 14.8° = 1.0237 and, on reduction with zinc-dust, yields a compound, $C_6H_{10}S$, which boils under the ordinary pressure at 135-139°; it also re-acts with potassium, decomposes into carbonic anhydride, oxalic, formic, and acetic acids, on oxidation with nitric acid, combines with halogens, and does not re-act with mercuric oxide, even at 100°.

Fraction 3 (20 per cent.), representing the portion passing over between 112° and 122° (16 mm.), has the empirical formula, $C_6H_{10}S_3$, its sp. gr. at 15° being 1.0845; it yields the compound, $C_6H_{10}S$, when heated with zinc-dust.

Fraction 4 (10.5 per cent.) consists of the residue boiling above 122° (16 mm.); it decomposes if the distillation is continued. On analysis, values were obtained approximating to those required by the formula $C_6H_{10}S_4$.

Oil of garlic contains neither allyl sulphide nor a sesquiterpene.—J. Ch. S. LXIV., pt. I (1893), p. 103.

The reserve material of the bulbs and other underground parts of certain monocotyledons (such as garlic, hyacinth, narcissus and tuberose) is a kind of inulin. To separate this substance, the bulbs, &c. are cut into small fragments, and digested with ether, to cause the expulsion of the sap from the cells; the sap collecting at the bottom of the vessel, together with a further amount remaining in the fragments, and liberated by pressure, is purified with basic lead acetate and animal charcoal, and the inulin precipitated by baryta water. The insoluble baryta compound of the carbo-hydrate is decomposed by carbonic anhydride, and the inulin precipitated with alcohol-ether as a syrup. Finally, this is dried in succession by washing with alcohol and ether, and then under diminished pressure, and at 100°.

The inulin of garlic, $C_6H_{10}O_5$, is a white, inodorous, amorphous powder, distinct from the inulin of the Jerusalem artichoke. Its taste is insipid, and it is very deliquescent. It melts at 175-176°, and is soluble in water and dilute alcohol, but only sparingly in strong alcohol. The rotatory power is $[\alpha]D = -39^\circ$. It does not reduce alkaline copper tartrate, and is completely hydrolysed by acids to levulose. It is precipitated neither by normal nor by basic lead acetate, except in presence of ammonia. It is not hydrolysed by amylase (malt diastase), but is resolved into levulose by an enzyme *inulase*, which is secreted by *Aspergillus niger*, and is similar to the enzyme of the inulin of the Jerusalem artichoke, and of *Atractylis*. The inulin of garlic is not fermented either by hydrolytic or non-hydrolytic yeasts.

The sap from the offshoots of the garlic bulbs contains only traces of reducing sugars, and yields nothing but levulose on hydrolysis, so that it contains no reserve material but inulin.—J. Ch. S. 1896 A. I. 5.

1283. *Urginea indica*, Kunth., H.F.B.I., VI., 347.
Roxb. 289.

Sans. :—Vana-palāndam.

Vern. :—Kándá, janglí-piyáz, kánde (Hind.); Jongli piaáj, ban-piaáj, kánde (Beng.); Iskíl, kúndri, kunda, korikan. (U. P.); Ghesuwa (Kumaon); Phaphor, kachwassal (Pb.); Ránácha-kándá (Mar.); Jangli-kándá, rankando (Guz.); Nari-vengáyam (Tam.); Nakka vulli-gadda (Tel.); Adavi-irulli (Kan.); Káttulli (Malay).

Habitat :—Simla, Dekkan, the Coromandel coast, Shaharanpur, Siwalik and also in the Tons valley. Sindh, on the lower hills. Bundelkhand and adjoining Central India States.

A small, annual, flabrous, herbaceous plant; flowers appearing before leaves. Bulbs of the size of a small orange or apple, bitter, nauseous, $\frac{1}{2}$ in. in diam. or more. Leaves radical, 6-18 in. by $\frac{1}{2}$ in. Scapes 12-18 in., erect. Bracts soon disappearing. Stalks 1-1 $\frac{1}{2}$ in. slender. Flowers drooping or spreading, distant,

in a terminal raceme, 6-12in. long. Perianth $\frac{1}{2}$ in. long, bell-shaped², 6-parted; segments white, with 3 green ribs in the centre; lip rounded. Stamens 6 at base of segments and shorter. Ovary 3-celled, 3-grooved. Style shorter than the ovary, straight, tapering downward, ovules several in each cell. Capsule $\frac{1}{2}$ - $\frac{3}{4}$ in., oblong, 3-valved; cells 6-9 seeded. Seeds many, flat, black, $\frac{1}{4}$ in. diam.

Uses:—The Hindus use the bulb in the preparation of *chândi-bhasma* or “ashes of silver,” which they employ medicinally. “Indian Mahomedan writers evidently consider the Indian squill as identical in medicinal properties with the squill of the Greeks; they prescribe it in the paralytic affections, also as an expectorant, digestive, diuretic, deobstruent and emmenagogue, in many diseases, more especially in asthma, dropsy, rheumatism, calculous affections, leprosy and skin diseases.” (Dymock). European writers vary much in their opinions regarding the medicinal properties of the drug. Ainslie states that it “is chiefly employed by farriers for horses in cases of strangury and fever.” Roxburgh writes that the bulb is quite as nauseous and bitter as that of the officinal squill; while O’Shaughnessy remarks that bulbs examined by him were inodorous, nearly tasteless, and devoid of any medicinal property. Bidie, Atkinson, U. C. Dutt, K. L. De, Dymock and others confirm the statement that the drug is an efficient substitute for *Urginea Scilla*. Moodeen Sheriff explains the discrepancy by stating that, when young and small, not exceeding a lime in size, it acts as a diuretic, in doses of 10-20 grains, even more powerfully than the officinal

* Mr. H. H. Haines, I.F.S., writes in the *Indian Forester* for July, 1917 p. 337 :—

In the Flora of British India, the perianth is described as campanulate, and this character is given in other works I have consulted including, I regret to say, my own Flora of Chota Nagpur, as, at that time, I had not observed the plant late of an evening. The description of the flowers of *Scilla* is given as stellate or campanulate, and although that description was not intended to mean in one and the same species, it really does apply to some species of both *Scilla* and *Urginea*. If one walks along a fire-line on a moonlight night, all the flowers of *Urginea indica*, whose night out it is—they only get one each in their lives—will be found wide open, stellately spreading and fragrant. It is then a very graceful pretty plant. Next morning all the flowers are campanulate, in which condition they have always been described.

squill, but that, as it grows larger, it becomes useless. The outer coats are always quite inert. It is also possible, as suggested by O'Shaughnessy, that the medicinal virtues may vary with the season and locality of collection. The officinal squill is well-known to be thus affected. On the Spanish coast, it has been found quite inert in one locality, while as active as usual at the distance of a few miles. A sufficient proof of its value, if collected and stored judiciously, is found in the fact that, for many years, it has been used as a substitute for the officinal squill at the Government Medical Store Dépôt in Bombay. The dried bulb met with in bazars sells at from 1 to 2 annas per lb. according to quality. (Dymock.)

"There are several other species of *Urinea* met with in India, and these are doubtless used in some cases as inferior grades. The most general substitutes or adulterants for the above are *Crinum asiaticum* and *latifolium*, *Dipcadi unicolor*, *Pancratium triflorum*."—Watt's Commercial Products, p. 1049.

In the *Indian Forester* for February, 1917, Mr. G. O. Coombs, Extra-deputy Conservator of Forests, writes—

The Director of Industries writes to say that there is no starch in the bulbs, but that, so far as his investigations have gone, they provide a valuable sizing agent, and he has hopes that the size may be taken up by the Cotton Mills. He further states that the bulbs furnish a substitute for gum tragacanth, and as such should have a commercial value, and he has reason to believe that they may have medicinal value as squills.

Chemical composition.—The sample dried at 100°C. was examined by Dragendorff's method, with the following results:—

Petroleum ether extract	...	...	0.086 per cent.
Ether extract	...	...	0.28 "
Absolute alcohol extract	...	...	1.52 "
Aqueous extract	...	...	77.30 "
Ash	...	...	5.69 "

The petroleum ether extract was a greasy white residue and non-crystalline. The ether extract contained no alkaloidal principle; under the microscope a few imperfect four-side plates were visible.

The alcoholic extract from 9 grams of the anhydrous squills injected into a cat's stomach caused vomiting in 20 minutes, and the passage of a solid stool about an hour after the injection; no blood in vomit or stool; the cat was not otherwise affected in any way. The aqueous extract consisted chiefly of gum.

The fresh squill in slices distilled with water afforded a distillate possessing an aromatic odour, but in which no appreciable amount of oil was visible. The distillate was agitated with ether; on spontaneous evaporation of the

ether, a minute trace of a white greasy residue was left, possessing an aromatic odour—applied to the skin, no irritation was induced. We are indebted to Assistant Surgeon C. L. Bose for the above analysis, which was conducted in the Chemical Examiner's Laboratory, Calcutta. (Pharmacographia Indica, III, 477-478.)

1284. *Scilla indica*, Baker, H.F.B.I., VI., 348.

Vern. :—Suphadie-khus (B.); Bhui-kándá, pahádi-kándá (H.); Nani jangli kando, laháná rán-kándá (Bomb.); Shirunari-ven-gayam (Tam.).

Habitat :—The Deccan Peninsula and Central India, from the Concan and Nagpur southwards, especially near the sea.

A scapigerous, annual herb, with a tunicate bulb. Bulb ovoid or globose, 1-1½ in. diam. Leaves few or many, spreading and often rooting at the tips, 3-6 in. by ½ in., variable from oblong to lanceolate or oblanceolate, sub-acute, narrowed into a sheathing petiole, rather fleshy, waved, obtusely keeled, dull, green above, and often blotched with black, pale and glaucous beneath. Scape 2-6 in., rather stout; raceme cylindric, 30-50-fid; bracts minute. Pedicels ½-¾ in., decurved. Flowers purplish or greenish-white, pendulous or cerunous. Perianth segments ½ in. long, linear, acute; filaments as long as the perianth segments; anthers small, shortly oblong. Ovary stipitate. Capsule 3-lobed, ½ in. long and broad, membranous; cells 1-2-seeded. Seeds cuneiform or clavate.

Uses :—Moodeen Sheriff describes the bulbs as more powerful than those of *Urginea Indica*, quite equal to the officinal drug of the British Pharmacopœia. He says they are particularly efficient if gathered soon after they have flowered, a fact which may have something to do with O'Shaugnessy's low estimate of their powers, since he remarks that the bulbs he made use of "had not flowered that season." The dose is from 1 to 4 grains.

1285. *Lilium giganteum*, Wall., H.F.B.I., VI. 349.

Vern. :—Giotra (Jaunsar).

Habitat :—Temperate Himalaya, from Garhwal to Sikkim; Khasia Hills.

Stem 6-12ft. long, tapering, hollow. Leaves 12-18in. long, broadly ovate-cordate. Flowers 5-7in. diam., drooping, fragrant; buds linear-oblong, 3-4in. long. Anthers $\frac{1}{2}$ in. long, versatile, yellow. Capsule 3in.; septa feathered. (Kanjilal).

Uses:—The leaves are employed as an external cooling application to alleviate the pains of wounds and bruises.

1286. *L. Wallichianum*, *Schultes fil.*, H.F.B.I., VI., 349.

Vern.:—Findora (H.).

Habitat:—Western Himalaya, Nepal and Kumaon.

Bulbous herbs; stems leafy, erect, unbranched. Bulbs of narrow, fleshy, imbricating scales, without any other coats, small, on a creeping root-stock; scales many, short, ovate, acuminate. Stem 3-6ft.; base ascending, few-fid. Leaves sessile, 6-12 by $\frac{1}{4}$ - $\frac{3}{4}$ in., lanceolate, narrowly linear, nerves 3-5 faint. Flowers sub-solitary, horizontal, sweet-scented, white or greenish-white; pedicel long; perianth 6-10in., narrowly tubular below, then infundibular, with the upper third curved; tube greenish outside; segments sub-equal, oblanceolate, 2in. broad. Stamens not diverging, much shorter than the perianth; anthers lin., orange-yellow. Style recurved at the top; stigma conoidal, capitate, obscurely 3-lobed. Capsule $1\frac{1}{2}$ -2in.

Uses:—The dried bulb scales possess demulcent properties and are used like salep in pectoral complaints. (Atkinson.)

1287. *Colchicum luteum*, *Baker*, H.F.B.I., VI., 356.

Sans.:—Hiranya tutha. (Golden collyrium).

Vern.:—Hiran tutiya (H.).

Habitat:—Western Temperate Himalaya; Kashmir; Chamba.

Corm gibbously ovoid, coats dark-brown. Leaves few, appearing with the flowers, linear, oblong or oblanceolate, obtuse, lorate, short at the flowering time, at fruiting 6-12 by $\frac{1}{4}$ - $\frac{1}{2}$ in.; lip rounded. Flowers 1-2 (in spring), 1-1 $\frac{1}{2}$ in. diam., when expanded golden-yellow. Tube 3-4in.; segments oblong or oblanceolate, obtuse, many nerved. Stamens shorter than the perianth; filaments very much shorter than the long,

yellow anthers. Style filiform, much longer than the perianth. Capsule 1-1½ in. ; valves with long, recurved beaks.

Uses.—C. Masson, in his narrative of an excursion into the Hazarah country in 1832 (Trans.-Bombay Geograph. Soc. ii., p. 60), notices a small bulbous root, which the Afghans dug up at Bād Assiar on the banks of the Helmund, and which appeared to be a kind of Colchicum, for the purpose of preparing Haran-tutiha, a medicine of great repute among the Afghans. He also remarks:—"It is sold in small pieces of a dark-brown colour, and resembles a dry extract." Masson travelled through a great part of Afghanistan on foot, mixing with all classes of the people, and his experience of their manners and customs is very interesting. (Pharmacogr. Indica III., 499-500).

The corms (or bulbous roots) constitute the bitter hermodactyl of the later Greeks, and are the *surinjan* of the Indian bazârs. The true Colchicum (*C. autumnale*) does not occur in India, but in the bazârs there are two forms sold, the bitter and the sweet. The latter is imported from Persia. European physicians in India consider the sweet root as inert, but they would seem to hold that the bitter one possesses similar properties to the true colchicum and may be substituted for it. Recently a few children were reported to have been poisoned at Kuldana in Rawalpindi through eating the seeds of this Indian colchicum. The seeds were accordingly chemically analysed at Calcutta (as also the roots), and tested physiologically. It was found that both possessed colchicine, of which the hundredth part of a grain proved fatal to cats. [Cf. Hooper, Rept. Labor. Ind. Mus. (Indust. Sec.), 1902-3, 28.] Watt. Com. Pro., p. 398.

In the Ph. J. for April 1, 1871, pp. 784-785, Dr. M. C. Cooke gave drawings of the starch granules of the tasteless and bitter hermodactyl, but he was not acquainted with the source of the latter, since he concluded his paper by saying "what is the source of bitter hermodactyls?"—B. D. B.

The seeds and roots contain colchicine.

1288. *Gloriosa superba*, Linn., H.F.B.I., VI., 358.

Sans.:—Lângalikâ, agnisikhâ, kalikari.

Vern.:—Nât-kâ-bachhnâg, karihâri, lānguli (H.); Bishalānguli, ulatchandâl, bisha (B.); Siric-samano (Santal); Mulim, kariâri (Pb.); Rājahrar (Ajmere); Nāgkaria, indai (Mar.); Kalai-paikishangu, kārtikaikishangu (Tam.); Agni-shikhâ, kalappa-gadda, adavi nābhi, potti dumpa (Tel.); Ventoni mendoni, (Malay); Sima-don, hsee-touk (Burm.); Neyangalla (Sing.).

Habitat:—Throughout Tropical India.

An herbaceous, tall, branching, glabrous climber. Root-stock of arched, solid, fleshy, cylindric, white or brownish corms, 6-12in. long and 1-1½in. diam., pointed at each end, bifurcately branched (or V-shaped), producing a new joint at the end of each branch. Roots fibrous; stems 10-12ft., given off from the angle of the young corms, herbaceous, terete. Leaves sessile, 6-8in., variable in breadth; base rounded, cordate or amplexicaul; pedicels 4-6in.; lip deflexed. Flowers 3-4in. across; segments linear, lanceolate, crisply waved. Filaments 2in. long, spreading, connective of anthers, ¼in. long, green. Style 2in. long. Capsule 2in., linear, oblong. Flowers at first greenish, passing through yellow-orange and scarlet to crimson from base to apex.

Uses:—According to the Nighantas, the root is purgative, hot, light and pungent; it increases the secretion of bile, and is useful in leprosy, piles, colic, boils and to expel intestinal worms.

“The root is supposed by Hindu and Muhammadan physicians to have valuable medicinal properties. Dutt writes, “It constituted one of the seven minor poisons of Sanskrit writers and had for one of its synonyms ‘*garbhaghātini*,’ or ‘the drug that causes abortion,’ but I am not aware of its being used as an abortive for criminal purposes. The tuberous root, powdered and reduced to a paste, is applied to the navel, suprapubic region, and vagina, with the object of promoting labour. In retained placenta, a paste of the root is applied to the palms and soles, while powdered *Nigella* seeds and long pepper are given internally with wine.” Early English writers on Indian botany and materia medica speak of it as a violent poison, but none furnish satisfactory details of a case in which marked ill-effects were produced by its use. It seems highly probable that these ill-effects have been greatly over-estimated, an assumption which is confirmed by experiments recently conducted by Moodeen Sheriff. In a special opinion kindly furnished to the editor he writes: “The root is not so poisonous as is generally supposed. I have taken it myself in small quantities,

gradually increasing the dose to 15 grains. There were no bad effects, but, on the contrary, my appetite improved, and I felt distinctly more active and stronger. I have been using it in my practice during the last sixteen or seventeen years, and consider it to be a pretty good tonic and stomachic. Dose from 5 to 12 grains three times daily." In Bombay, it is supposed to be an anthelmintic, and is accordingly frequently administered to cattle affected by worms. In Madras, it is believed to be specific against the bites of poisonous snakes, and the stings of scorpions, and is also used as an external application in parasitical affections of the skin. Surgeon-Major Thomson, C.I.E., has kindly furnished the following information regarding its utilisation in Madras :—

"There are two varieties of this plant. The root of one plant divides dichotomously, that of the other does not divide at all, but appears as a single piece shooting into the ground. The former is supposed by the natives to be the male plant, the latter the female. The male root is gathered during the flowering season, cut up in thin slices and soaked in butter-milk to which a little salt is added. In this composition it is soaked by night and dried by day for four or five days. It is eventually dried well and preserved. By this process, its poisonous properties are said to be removed. When so prepared, and administered by giving a piece or two internally in a case of cobra bite, it is said to be an effectual antidote in cobra poisoning. It is called in Tamil '*Katharum cheddy*.' In scorpion and centipede stings and bites, relief is obtained from the pain by applying a paste of the root rubbed up with cold water and then warming the part affected over the fire. This paste is applied also for parasitic affections of the skin."

The starch obtained from the root by washing is given internally in gonorrhœa.

Notwithstanding its characteristic appearance, the tuber is occasionally employed as an adulterant of the roots of *Aconitum ferox*, to which, indeed, it is believed to be closely allied in therapeutical properties.—(Watt Dic. Ec. Pro. Ind. III. 507.)

This plant is one of the nine secondary poisons mentioned by Hindu writers. * * * * Ancient Hindu writers agree in attributing violent emetic properties to the root; it is also said to cause abortion, and as such prescribed by Hindu physicians for expelling retained after-births. Dr. Dymock, in citing the researches of Warden, says that there are two resins and a bitter principle in the root. Warden names this bitter principle superbine, and considers it identical with that of *Urginea Scilla*, the ordinary Squill. The bitter active principle of Squill, says Dr. Lauder-Brunton, is a glucoside Scillitoxin or Scillain. The Scillitin of some authors is probably slightly impure Scillitoxin (Pharmacology, p. 962). Squill is classed by Lauder-Brunton among stimulants of the Cardiac muscle, when moderate doses are given. When, on the other hand, larger doses are given, it acts as a "Cardiac poison" (p. 276, Op. cit.). In such cases, that is to say, where the dose is large, "the stage of stimulation is followed by one of peristaltic action and final arrest in Systole." In excessive doses, "the operation of Squills," says Dr. Waring (Therapeutics, p. 489), "is that of an acro-narcotic poison, 24 grains having proved fatal. Squill is known to cause nausea; a small dose may act with extreme violence. I have already said that the plant is well-known among the Hindus as possessing emetic properties. The conjecture of Warden is, in my opinion, based on a striking similarity of the physiological effects of the two plants on the human body. (Kirtikar's Pois. Pl. of Bombay).

N. O. PONTEDERIAEÆ.

1289. *Monochoria vaginalis*, Presl., H.F.B.I., VI., 363.

Syn.:—*Pontederia vaginalis*, Linn., Roxb. *Fl. Ind.*, II., 121.

Vern.:—Nanka (Beng.); Nirocancha (Tel.).

Habitat:—Throughout India, in fresh water ponds and marshes. From Kashmir to Assam; Travancore.

A most variable herb. Root-stock short, sub-erect or creeping, spongy. Leaves very variable, long-petioled, 2-4in., from

linear to ovate or ovate-cordate to acuminate, 7-9-veined, sometimes as broad as long. Petioles of lower leaves stout, terete; pedicels short, emerging from the channelled sheaths of the uppermost leaves. Racemes sub-sessile, spiciform, young, globose; rhachis lengthening as the flowers expand; terminal flower the first to open. Pedicels $\frac{1}{2}$ in. Perianth $\frac{1}{2}$ in. across; segments unequal, 3 larger obovate, 3 smaller oblong, blue; stamens 6, inserted on the base of the perianth segment, one longish with the filaments, spurred, large; anther dark-blue, the others yellow. Capsule $\frac{2}{3}$ in. long, oblong.

Use:—The root is chewed for toothache, and the bark eaten with sugar for asthma. (Atkinson).

N. O. XYRIDEÆ.

1290. *Xyris indica*, Linn., H.F.B.I., VI., 364. Roxb. 60.

Sans.:—Dádamari.

Vern.:—Dâdmâri (H.); Chine ghás, debidubba (Beng.); Kotsjillettipullu, kotsjilletri (Mal.);

Habitat:—Marshy ground, in low country; Bengal; Sikkim; Assam; Khasia Hills. Salt marshes in the Southern Konkan to Ceylon.

Erect, tufted, rush-like, scapigerous, glabrous, annual herbs, 1-2 ft. high. Stem short, simple. Leaves radical, as long as the scape, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad, bifarious, loriform (thong-shaped) or ensiform, spongy, narrowed to an obtuse tip; scape robust, grooved; angles acute; spike $\frac{1}{2}$ -1 $\frac{1}{2}$ in., cylindric, ovoid or globose; bracts many, $\frac{1}{4}$ in. diam., broader than long, orbicular or cuneately obovoid, tumid, dark red-brown, shining, very coriaceous; margins scarious; flowers $\frac{1}{2}$ in. broad, yellow, lateral bracteoles dorsally winged; wing serrulate; claw of petal as long as the sepal. Petal limb orbicular, erose; stamens 3, inserted on petal; filament short, broad; anther oblong, 2 cells, obtuse above, acute at the base; staminodes 2-3-fid; arms long; stigmas truncate. (Trimen.)

Uses :—"The natives of Bengal esteem it a plant of great value, because they think it an easy, speedy and certain cure for the troublesome eruption called ringworm. (Hon'ble John Hyde, in a letter to Roxburgh.) Agardh notices its use in itch and leprosy. (Dymock.)

Chemical composition—The plant contains a red colouring matter soluble in alcohol and intensified by alkalies and having some reactions peculiar to chrysophanic acid. (Pharmacogr. Ind., III., 511.)

N. O. COMMELINACEÆ.

1291. *Commelina obliqua*, Ham., H.F.B.I., VI., 372.

Syn. :—*C. communis*, Roxb. 57.

Sans. :—Kanchata.

Vern. :—Korna, kanjurá, kána (Hind); Játa-kanchura, játa-kansbira (B.).

Habitat :—Throughout India, from the base of the Himalaya to 6,000ft. The Western Ghats, Singapore, Ceylon.

An annual herb, 2-3ft., stout, branched, glabrous. Branches widely creeping below. Leaves very variable, 4-7 by 1-2in., sessile or petioled, lanceolate or ovate-lanceolate, finely acuminate or caudate, membranous, glabrous, scabrous or villous. Sheath $\frac{3}{4}$ -lin.; mouth ciliate, with long hairs. Spathes sessile or very shortly peduncled, $\frac{3}{4}$ -lin. broad and long, solitary or crowded, turbinate funnel-shaped, cuspidate, glabrous. Raceme usually simple. Flowers bright-blue, $\frac{2}{3}$ in. across, clawed. Petals orbicular, pale-blue, one of them nearly white (Collett). Ovary 3-celled. Ovule 1 in each cell. Capsule $\frac{1}{2}$ in. long obovoid or oblong, trigonous, 3-celled, 3-valved, 3-seeded. Seeds $\frac{3}{4}$ in. long, oblong or ellipsoid smooth, puberulous, lead-coloured, margins often marbled. (Trimen.) (J. D. Hooker).

Uses :—The root is useful in vertigo, fevers and bilious affections, and as an antidote to snake-bites. (Atkinson.) According to Loureiro, it is refrigerant and laxative, and to be useful in strangury and costiveness.

The authors of the *Pharmacographia Indica* (III. 509), speaking of *C. Bengalensis*, Linn. write:—"This and several other species of *Commelina* are included under the Sanskrit name Kanchata * * * The stems, roots and seeds which contain much mucilage and starch are used on account of their demulcent properties.

1292. *C. suffruticosa*, Blume., H.F.B.I., VI., 374.

Vern. :—Dare orsa (Santal).

Habitat :—Tropical India, from Nepal, Sikkim and Bengal to Central India.

An annual branching herb, usually slender and creeping below. Stems stout, branched, nearly glabrous. Leaves 3-14 in. by $\frac{3}{4}$ -2 in., acuminate, sessile, lanceolate, scabridly pubescent; sheaths auricled. Spathes $\frac{1}{3}$ - $\frac{1}{2}$ in. long and broad, small, shortly peduncled, broadly ovate, cordate between, cucullate and complicate, paniced or clustered, acute or obtuse, villous. Raceme simple, 6-12-fid. Petals white or blue. Seeds straw-coloured, puberulous, ellipsoid, rugose. Capsules 2-celled.

Use :—The root is applied by Santals to sores. (Campbell.)

1293. *Aneilema scapiflorum*, Wight, H.F.B.I., VI., 375.

Syn. :—*Commelina scapiflora*, Roxb. 59.

Vern. :—Siyâh mûslî (Hind.); Kureli (B.); Sis-muliâ (Guj.).

Habitat :—Temperate and Tropical Himalaya, from the Upper Gangetic plain, eastwards to Bhutan, Travancore and Tenasserim.

Simple herbs. Roots of elongated tubers. Leaves all radical, 4-10 in., erect, finely acuminate, narrowly ensiform. Scape erect, with narrow, strict, elongate panicle 8-18 in. Bracts large, sheathing, lower ones long, upper small, amplexicaul. Flowers small. Capsule ellipsoid, trigonous, $\frac{1}{4}$ in., mucronate. Seeds in a triangular column, angled, straw-coloured, with a white, minutely reticulate and glandular epidermis, 3-6—superposed in each cell. (J. D. Hooker).

Uses :—Said to have astringent and tonic properties, and considered to be hot and dry; useful in headache, giddiness,

fever, jaundice and deafness. It is also an antidote to poisons, and regarded as a cure for snake-bites. "Root-bark dried in the shade is said to have been employed with benefit in asthma. Also used in colic, piles and infantile convulsions. It is used for incontinence of urine. The dried powder, mixed with sugar, is used as an aphrodisiac. With the juice of the *tulsi* leaves, it is administered for pains in the kidneys, and one of the chief remedies used by the Hakims in spermatorrhœa. (Watt's Dictionary.)

1294. *Cyanotis tuberosa*, Schultes., H.F.B.I., VI., 386.

Syn.:—*Tradescantia tuberosa*, Roxb. 280.

Habitat:—In damp sandy grounds of Ceylon, the Dekkan Peninsula; on the west side, from the Konkan to Travancore.

Stems 6in.-3ft., sub-erect or procumbent and creeping below, more or less hirsute. Roots of fleshy, cylindric fibres or tubers. Radical leaves sessile, ensiform, 6-10in. by $\frac{1}{2}$ lin., often purple beneath, scaberulous. Cauline leaves narrowly oblong, distant or in distant fascicles, falcate, short, often purple beneath, linear or ensiform, villous; sheath of radical lin. long, glabrous or of the cauline leaves, softly silky. Cymes villous or densely hirsute, $\frac{1}{2}$ lin., usually peduncled in the axils of short, ovate, acute leaves, upper often corymbose, strongly falcately decurved. Bracts ovate or lanceolate, falcate, shorter than the cyme. Bracteoles $\frac{1}{2}$ - $\frac{2}{3}$ in. (J. D. Hooker), $\frac{1}{8}$ - $\frac{1}{2}$ in. (Trimen), dimidiate-ovate or lanceolate, acute, falcate, villous or densely hirsute. Sépals $\frac{1}{4}$ by $\frac{1}{16}$ in., linear, oblong, acute, villous. Corolla $\frac{1}{2}$ in. long, tube funnel-shaped; lobes rounded, short, $\frac{1}{10}$ - $\frac{1}{8}$ in. long, blue-purple. Filaments bearded, fusi-form towards the tips; anthers $\frac{1}{10}$ in. long, yellow. Style thickened at the tip, with a tuft of hairs near the apex. Capsule $\frac{1}{8}$ by $\frac{1}{10}$ in., softly hirsute, hairy above. Seeds $\frac{1}{16}$ in. long and broad, brown, conic, obscurely rugose. A most variable plant in habit, foliage and pubescence.

Use:—The root is used by the Santals in long continued fevers and also worms in cattle. (Campbell.)—Watt ii, 674.

1295. *C. axillaris*, Ræm et Schultes, H.F.B.I., VI., 388, Roxb. 280.

Syn. :—*Tradescantia axillaris*, Linn. 116.

Vern. :—Nirpulli (Tam.); Soltraj, baghanulla (H.); Itsaka (Bomb.); Golagandi (Tel.).

Habitat :—Throughout India, in the plains, from the Upper Gangetic Valley to Assam, Ceylon low country.

Annual herbs, with stems 6-18in., stout or slender, elongate, glabrous or sparsely hairy, diffusely branched, leafy. Branches sub-erect and creeping below or prostrate; internodes 1-3in.; roots fibrous. Leaves sessile, 2-6 by $\frac{1}{8}$ - $\frac{1}{2}$ in., narrowly linear or linear-lanceolate, acute or acuminate, flat, glabrous or hairy; sheath $\frac{1}{4}$ - $\frac{1}{2}$ in., mouth ciliate. Cymes reduced to axillary fascicles of flowers, with the small, linear or linear-lanceolate bracteoles, almost concealed in the leaf sheaths. Flowers bright-violet-blue. Sepal $\frac{1}{2}$ in., spathulately lanceolate, acuminate, sparingly hairy. Corolla petal long-clawed; tube $\frac{1}{2}$ in. long; lobes small, rounded; filaments fusiform below the tip. Style bearded, glabrous. Capsule $\frac{1}{2}$ - $\frac{3}{4}$ in. long, shortly stipitate, long-beaked, quite glabrous; beak half as long as the body. Seeds large, up to $\frac{1}{10}$ in. long, oblong, compressed or ventrally concave, brown, shining, cancellate, with shallow pits.

Uses :—On the Malabar Coast, this is viewed as a useful remedy in tympanites. (Rheede). It was one of the plants brought to Dr. Buchanan Hamilton while in Behar, as a useful medicine for external application in cases of ascites, especially when mixed with a little oil. (Ainslie.)

Lyon found the seeds to have the following percentage composition:—Water 10.29, fat 0.62, albuminoids 15.99, carbohydrates 24.79, cellulose 9.36, ash 8.89. The nitrogen was estimated at 11.28 grains per oz., and the nutritive carbon at 145.80 per oz. He calculates the nutritive value of the seeds as compared with the average cereal at 100.00 to be 85.76. (Pharmacogr. Ind., III. 510.)

N. O. FLAGELLARIEÆ.

1296. *Flagellaria indica*, Linn., H.F.B.I., VI. 391.

Habitat :—Throughout India, chiefly near the coast, from the Sunderbuns and Chittagong to Ceylon and Singapore.

A reed-like climber, quite glabrous, climbing over lofty trees by the leaf-tendrils; stem nearly 1 in. thick towards the base, terete, smooth; branches clothed with cylindric, smooth, striate, closed, truncate sheaths; branchlets as thick as a crow-quill. Leaves sessile, 6-10 in. long, variable in breadth, lanceolate from a rounded base, shortly narrowed into the sheath, drawn out at the apex into a slender spiral tendril, many-nerved; sheaths cylindric, striate, 2-auricled at the apex. Flowers white, in shortly pedunculate, irregularly laxly branched panicles, 6-12 in. long. Outer perianth-segments $\frac{1}{10}$ in. long, broadly ovate or suborbicular, obtuse; inner segments similar, more or less unequal. Anthers $\frac{1}{2}$ in. long, deeply 2-fid at the base. Ovary to top of stigma $\frac{1}{10}$ in. long; style-arms about $\frac{1}{10}$ in. long. Drupe pisiform, red, smooth. (Cooke).

Use:—The leaves are said to be astringent and vulnerary. (Bailey.)

N. O. PALMEÆ.

1297. *Areca Catechu*, Linn., H.F.B.I., VI., 405; Roxb. 665.

Sans.:—Puga-phalam; Gubāk.

Vern.:—Supāri (H. & B.); Tāmbul (Ass.); Poka-vakka, vakka (Tel.); Kamugu, pákku, kottai-pákku (Tam.); Adike (Kan.).

Engl.:—Betel-nut.

Habitat:—Cultivated in many parts of India.

Trunk solitary, 40-100 ft. Leaves 4-6 ft.; leaflets numerous, 1-2 ft., upper confluent, quite glabrous. Spathe glabrous, compressed. Spadix much branched; rachis stout, compressed; branches with filiform tips bearing more or less distichous, minute male flowers. Female flower solitary at the base and axils of the branches; sepals 1 in., ovate, obtuse; petals sub-similar; staminodes 6, connate. Fruit $1\frac{1}{2}$ -2 in., smooth, orange or scarlet.⁶

* Mr. M. K. Venkata Rau of Bangalore, has described a variety, *Areca Catechu*, Var. *deliciosa*. He says:—"The ordinary betel-nut has a very astringent taste when tasted raw (before boiling). * * The present variety is fairly sweet to eat and is further distinguished by the fact that the endosperm is much lighter in color and softer." (Jour. Bo. N. H. S. XXII, 798).

Uses:—Young nut possesses decided astringent properties, and is prescribed in bowel complaints and bad ulcers. It contains a large proportion of tannic and gallic acids, and hence its astringent property. The burnt nuts, when powdered, form an excellent dentifrice. According to Dr. J. Shortt, the powdered nut, in doses of 10 or 15 grains every three or four hours, is useful in checking diarrhoea arising from debility. It has also been found very useful in urinary disorders, and is reported to possess aphrodisiac properties. The dried nuts, when chewed, produce stimulant and exhilarant effects on the system.

"The powdered seeds have also long been held in some reputation as an anthelmintic for dogs, and Areca has now been introduced into the British Pharmacopœia on account of its supposed efficacy in promoting the expulsion of the tape-worm in the human subject. It is also reputed to be efficacious against round worm (*Ascaris lumbricoides*). Dr. Barclay, who appears to have been the first practitioner who called attention to the remedial value of the areca-nut in the expulsion of tape-worm, administered it, in powder, in doses of from four to six drachms, stirred up with milk." (Bentl. & Trim. Med. Pl.)^{*} Dr. Waring says: "Anthelmintic virtues have been assigned to the nut, but it can hardly have any claim to this character, as amongst the Hindus and Burmese, who use it habitually as a masticatory, intestinal worms (*lumbrici*) are almost universally met with."

The nut is regarded as a nervine tonic and emmenagogue, and is used as an astringent lotion for the eyes. The juice

* In a note on the subject published in the *Pharmaceutical Journal* for February 14, 1874, Mr. Charles Andrews wrote that in his experience, acquired during a residence in the Bombay Presidency, he had frequently known it to be used with very good effect as an anthelmintic. It is picked off the tree, and grated on an ordinary nutmeg grater. About a tea-spoonful is administered, after the patient has fasted twelve to fourteen hours, either made up into a bolus with ghee (clarified butter) or floating on milk, the latter being the favourite method. It generally acts (without any other medicine being given) in about an hour after administration, and is efficacious for round as well as tape worms. In his opinion it is more useful, given grated than in a fine powder.

of the young leaves, mixed with oil, is said to be used externally in lumbago. The dry expanded petioles may be used as ready-made splints.

"Is useful in checking the pyrosis of pregnancy. 'Control experiments' made with tincture of catechu showed the superiority of the nut, and would seem to demonstrate that this is not merely due to astringent action; possibly its property as a nervine stimulant enhances its utility." (Surgeon G. King, Madras.) "Used as an astringent for bleeding gums; women employ it both internally and locally for stopping watery discharges from the vagina." (Asst. Surg. Jaswant Rai, Mooltan, in Watt's Dic.).*

"The nut has been investigated by Her Jahns, who reports that he has separated from it three alkaloids, of which arecoline is the most important."—Ph. J., Feb. 2, 1889. p. 605.

"Without doubt, arecoline is the physiologically active constituent of the areca-nut, and the one on which its action against tape-worm is dependent. In the opinion of Dr. Maume, the physiological experiments indicate that the areca-nut may prove a valuable article, since there can be no doubt that arecoline hydro-bromide is capable of being utilized therapeutically on account of its effect on the peristaltic action of the bowels, and

* Mr. John R. Jackson, A. L. S., Curator of the Museums, Kew, wrote in the *Pharmaceutical Journal* for Feby 28, 1874:—

In some parts of China the nuts, bruised and powdered, are mixed with the green food given to horses, and they are thus considered a preventive against diarrhoea. In the north of China, small pieces of the nut are boiled and the decoction is taken as a domestic remedy in various visceral affections.

Though the use of the betel as a masticatory turns the teeth black, it is said to preserve them from decay in a remarkable manner, and this may be the reason why some English chemists have introduced the pulverized charcoal into this country as a tooth powder.

In Borneo the flowers, which are fragrant, are mixed with medicines and used as charms for the cure of many diseases. In some parts of India, the juice of the young tender leaves mixed with oil is applied as an embrocation in cases of lumbago, and a decoction of the root is a reputed cure for sore lips, so that, whatever may prove to be the value of the areca-nut as an anthelmintic in this country, it is certain that the tree is much esteemed for its numerous uses in the East.

on entozoa, and also in suitable combination as a cardiac remedy."—Ph. J., Feb. 23, 1889, pp. 667-668.

Areca nuts contain about 14 per cent. of fat. An elaborate analysis of the fat has been made by A. Rathje (*Archiv. de Pharmazie*, 246, 9, 1908, 703), in which it appears to resemble cocoanut oil, but the extensive use of the nuts in the East as a masticatory precludes this oil from reaching any commercial importance. (*Agri. Ledger*, 1911-12, No. 7, p. 168).

1298. *Caryota urens*, Linn., H.F.B.I., VI. 422; Roxb. 668.

Eng.:—Hill Palm; Sago Palm.

Vern.:—Mari (H.); Rung-bong, simong (Lep.); Bara flawar (Ass.); Salopa (Uriya); (Duk.); Bherawa, berli, bhirli mahad, berli mād, bherlá máda, berli mhár, ardhi supári (Mar.); Bhirli-mád, birli-mhar (Bomb.); Shiwajatá, shankarjatá (Guz.); Birli-mád (Konkan); Mhár mardi, mari, jirúgú, goragú (Tel.); Conda-panna, erim-panna, utalipanna (Tam.); Bhyni, beina, bagni (Kan.); Shunda pana (Mal.).

Habitat:—Throughout the northern parts of India.

Tall palms, 40-60ft. high by 1-1½ft. in dim., soboliferous or not, flowering from the upper leaf-sheaths, and successively from lower (alternately male and female); trunk naked or sheathed. Leaves few, very large, 18-20 by 10-15ft. broad, bipinnatisect; leaflets 4-8in. long, very obliquely dimidiately flabelliform, or cuneiform, præmorse or rounded at the tip, petiolules or bases swollen at the insertion. Spathes 3-5, incomplete, tubular, 1½ft. long. Spadices 10-12ft. long, interfoliar, shortly peduncled, much fastigiately branched; branches slender, pendulous; flowers solitary and male, or 3-nate with the intermediate female. Male flowers symmetric; sepals rounded, imbricate; petals linear-oblong, valvate; stamens about 40; filaments very short, white; anthers acuminate, long. Fem. fl. subglobose, sepals 3, rounded, imbricate, rather broader than in the male; petals ¾-1in. in diam., rounded, valvate; ovary 3-celled, stigma 3-lobed, ovules erect. Fruit 1 or 2 globose, 1-2-seeded, stigma terminal. Seeds erect; albumen ruminant; embryo dorsal.

Uses:—"An excellent spirit is obtained by the fermentation and distillation of the toddy obtained from this elegant palm,

which is not uncommon on the west coast of the Madras Peninsula. It is well adapted for pharmaceutical purposes. A glass of the freshly-drawn toddy, taken early in the morning, acts as a laxative." (Pharm. of India.)

"The nut is used as an application to the head in cases of hemicrania, from an idea of the supposed efficiency of the half-nut in curing the affected half of the head." (S. Arjun.) The pith or farinaceous part of the trunk of old trees is considered to be almost equal to the best sago of commerce ; it is baked into bread and boiled into a thick gruel.

1299. *Phoenix dactylifera*, Linn., H.F.B.I., VI., 425, Roxb. 723.

Sans. :—Kharjura ; Pinda Kharjura.

Vern. :—Tree=Khajúr, khají ; fruit=khúrma, chhúhárá, kukyán, khujiyán, kujran, pindakhejúr (Hind.) ; tr.=Khájúr. fr.=khurmá, pindakhejúr (Beng.) ; Kasser (Bhot.) ; tr.=khajúr khají ; fr.=pind, chírwai, bagrí, khajúr, kukyán ; cabbage of leaves=gadda, gallí ; gum=hokmchil, gond, sher-i-darakht-i-khurma (Pb.) ; tr.=mach, fr.=khurmá (N. Baluch.) ; Kajura (Pushtu) ; Karmah (Turki) ; Pind chirdi, kurma, tár, khají ; fr.=jarikha, clanuko (Sind.) ; tr.=khajúr, fr.=tamara, rájib, nakel, kurma, chuara (Bomb.) ; Kharjúr (Mar.) ; Khajúr, khárik* (Guz.) ; fr.=périch-chankay (Tam.) ; Kharjúrapu, perita ; mudda kharjúrapú ; fr.=karjúru-káya (Tel.) ; Kharjúra (Kan.) ; fr.=Teních-chan-káya (Malay.).

Habitat :—Cultivated in the Punjab, Sind and Trans-Indus.

A tall palm, attaining 100-120ft., the foot often surrounded by a dense mass of root-sacks. Leaves grey, longer than those of *P. sylvestris*. Leaflets making a very acute angle with the common petiole. Fruit 1-3in. long ; pulp substantial, very sweet. The best fruit comes from Muscat ; the next best is that from Persia.

Uses :—Dates are considered demulcent, expectorant, laxative, nutrient and aphrodisiac. They are prescribed in cases

*Kharik is young *Khajur*, boiled in milk, hence its crumpled form (K.R.K.).

of cough, asthma and other chest complaints ; also in fever, gonorrhœa, &c. The gum is esteemed as a useful remedy in diarrhœa and diseases of the genito-urinary system. Long continued use of the fruit is said to produce soreness of the gums. Honigberger states that the inspissated juice was, in his time, officinal in Lahore. The natives of South India make a paste of the seeds by trituration with water, and apply it over the eyelids for opacity of the cornea. The fresh juice is cooling and laxative. In the cold season, when the juice does not undergo fermentation, it is an excellent medicine.

"Date-sugar" is more nutritious and agreeable than Cane-sugar. It can be used as a substitute for maltine and its various preparations. (Dr. R. L. Dutt. in Watt's Dic).

The tree yields a gum (*huku chil*), used medicinally in the Punjab (Watt.)

1300. *P. sylvestris*, Roxb., H.F.B.I., VI., 425 ; Roxb. 723.

Sans. :—Khurjhûri, kharjuru, madhukshîr.

Vern. :—Sendhi, khajûr, khaji, thalma, (H.) ; Kajar, khejur (Beng.) ; Khejuri (Ur.) ; Khajur (Kol.) ; Khijur (Santal) ; Sindi (Gond.) ; Khajûr, khaji, juice=sendhî, târi (Pb.) ; Sendi (Berar) ; Boichand, sendri, Shindi (Mar.) ; Karak (Guz.) ; Itchumpannay, peria-itcham itchamnâr, (Tam.) ; Ita, peddaita, ita-nara, ishanchedi (Tel.) ; Ichal kullu, ichalu mara (Kan.)

Habitat :—Cultivated throughout the plains of India and Burma. Wild in the Indus basin. The seeds are eaten by birds and dropped undigested with their excreta. That may partly account for so-called wild growth of this very handsome hardy palm.

An erect palm, reaching 40-50ft. high, 1-2ft. in girth. Stem thick, densely crowded with the bases of the petioles of the leaves or marked by prominent scars if the leaves have fallen. Wood light-brown, outer cylinder hard and rough ; inner soft. The crown 12-15ft. in diameter. Near the ground there is often a dense mass of rootlets, no root-suckers. Leaves 10-15ft., quite glabrous, greyish-green. Spines up to 4in. long ; leaflets 6-18

by $\frac{3}{4}$ -lin.; common petiole at base $\frac{3}{4}$ -lin. broad; the fascicles of leaflets up to 3in. apart. Spathe 12-14in., scurfy. Spadices erect, fruiting inclined, with spreading branches. Branches of male filiform. Male inflorescence, says Brandis, "white, scented, compact, on short peduncle." Fruiting peduncle 2-2 $\frac{1}{2}$ ft. long, 1-1 $\frac{1}{2}$ ft. wide, terminating in large branches of spikes; spathe thick, almost woody. Fruit 1-1 $\frac{1}{2}$ in. long, yellow while ripening, reddish-brown when fully ripe, then sweet pulp around the terete; stony hard seed—seed ventrally grooved—in long embryo, ventral.

Uses:—The fruit, pounded and mixed with almonds, quince seeds, pistachio nuts, spices and sugar forms a *paushtik*, or restorative remedy, much in vogue. A paste, formed of kernels and the root of the *Achryanthes aspera*, is eaten with betel leaves as a remedy for ague. (Dymock.) The juice obtained from the tree is considered a cooling beverage. The central tender part is used in gonorrhœa and gleet. The root is used in tooth-ache. From the tree a gum is obtained, of which very little is known.

1301. *Nannorhops Ritchieana*, H. Wendl., H.F.B.I., VI., 429.

Vern.:—Mazri, nozarái (Trans.-Indus); Kilu, kaliúm (Salt Range); Pfis, pesh, pharra (Sind and Beluch.); Maizurrye (Pushtu).

Habitat:—Sindh, Afghanistan, Baluchistan and the Western Punjab.

A gregarious, tufted, low-growing, glabrous palm, with prostrate branching, robust rhizomes or stems, 8-10ft. long, as thick as a man's arm, dichotomously branched, covered with the old leaf sheaths. Leaves 2-4ft. long and broad, whitish, split to the middle or lower into rigid segments, with often interposed fibres. Petiole unarmed, 6-12in.; margins serrulate. Spadix pyramidal, 2-3ft. Branches ascending and recurved. Branchlets slender. Flowers in pair within a membranous spathella, one sessile, bracteate, the other pedicelled or bracteate. Flowers polygamous, male and bisexual in a large, erect, pyramidal,

much ramified panicle, the branches in the axils of coriaceous sheaths narrowed into a lanceolate blade. Calyx and petals thinly membranous. Stamens 6, sometimes 9 in. in the male flower. Stamens in the male flower inserted in the corolla-tube in the hermaphrodite flower in its throat; anthers deeply sagittate. Ovary 3-celled, narrowed into a style. Drupe globose, ellipsoid or oblong. (Beccari and Hooker). 1-seeded, globose, $\frac{3}{4}$ in. diam.

Uses:—The delicate young leaves are given in diarrhoea and dysentery. They are also purgative; chiefly used in veterinary medicine. (Bellew.)

1302. *Borassus flabellifor*, Linn., H.F.B.I., VI. 482; Roxb. 724.

Sans.:—Tála.

Vern.:—Tál, tár, (H.); Tâl (B.); Tale (Santal); Tâd, Dral (Guz.); tâda, talat-mâd (Mar.); Potu-tati, tâti-chettu (Tel.); Panaimaram panam, pampai (Tam.); Panâ (Mal.); Tâll, tâlé pané-mare (Kan.)

Habitat:—Cultivated throughout Tropical India, Bengal and southern part of the United Provinces.

Trunk attains 100ft. high and 2ft. in diam. near the ground, with a dense mass of long rootlets, often swollen above the middle, when young covered with dry leaves or the bases of petioles, when old marked with the black narrow scars of the latter. Leaves 3-5ft. in diam.; segments 60-80, shining, folded along the midrib, linear-lanceolate; petioles 2-4ft. long, semiterete, the margins with hard spinescent serratures. Flowers diœcious. Spadix very large, simply branched, sheathed with numerous open spathes. Male flowers small; spikes 1-3 at the ends of the branches, cylindric, densely clothed with imbricating bracts; numerous minute secund spikelets concealed by the bracts so as to appear immersed in the spike, the flowers coming to the surface one by one as they successively open. Stamens 6; filaments connate with the corolla into a stalk. Female flowers larger, globose, lin. in diam.; perianth fleshy, greatly accrescent. Sepals imbricate. Petals smaller, convolute. Staminodes 6-9.

Ovary 3-4-celled. Fruit a large subglobose brown drupe, 6in. in diam. or more, with 1-3 obcordate fibrous pyrenes, enclosed by the enlarged perianth. Seeds oblong, 3-lobed at the top; albumen uniform, hollow. (Cooke).

Uses :—The juice of this plant is used as a stimulant and antiphlegmatic. The *ash* of the dry spadix is used as an *antacid* in heartburn. The saccharine juice, when freshly drawn, is exceedingly sweet, and, if taken regularly for several mornings in succession, acts as a laxative. The light-brown, cotton-like substance from the outside of the base of the fronds, is employed by the Cinghalese doctors as a styptic to arrest hæmorrhage from superficial wounds. The fresh juice is also useful in inflammatory affections and dropsy. Vinegar, toddy and a spirituous liquor are made from this tree. The juice slightly fermented is used in diabetes. The ash of the spadix is given internally in bilious affections. This ash is also used in preparing dyes.

The ash acts as a powerful blister and applied on enlarged liver and spleen in combination with some other demulcents. The pulp of the ripe fruit is applied externally in skin diseases. Palm sugar is antibilious and alterative and used in hepatic disorders and gleet. The juice is diuretic and prescribed in chronic gonorrhæa (T. N. Mukherje). "The root is cooling and restorative. The ashes of the flowering stalk said to be useful in enlarged spleen." (U. C. Dutt.)

"A useful stimulating application, called toddy poultice, is prepared by adding fresh-drawn toddy to rice-flour till it has the consistence of soft poultice, and, this being subjected to a gentle fire, fermentation takes place. This, spread on a cloth and applied to the affected part, acts as a valuable stimulant application to gangrenous ulcerations, carbuncles and indolent ulcers." (Ph. Ind.)

The expressed juice of the leaf-stalk and young root is used in cases of gastric catarrh and to check hiccup. The fermented juice sometimes acts as a drastic purgative. An extract of the green leaves is used internally in secondary syphilis. The ash of dry spadix is largely used as an antiperiodic; it is feebly so. (Watt's Dict.).

Revd. Father J. E. Blatter, S. J. Professor of Botany, St. Xavier's College, Bombay, in his account of this palm in the Journal of the Bombay Natural History Society, Vol. XXI, has reprinted an English translation of a Tamil poem, entitled "Tala Vilasum," written by "Arunachalam, a poet of Terruk-Kudantei, the same with Combaconam in the province of Tanjore." This poem enumerates no less than 801 different purposes to which the Palmyra may be applied. The extracts given below show some of its uses in medicine :

Gripping of the bowels, diarrhœa and lodging of small fish bones in the œsophagus may be removed by eating dried Palmyra pulp.

If the flour of the dried edible Palmyra-root (Odiā) be mixed with Coconut milk, salt water and fish, and if the paste be steamed, the cake when eaten will daily add strength to any body. The middle pieces of the Odiā are cleared of their outer fibrous skin, soaked in water, then dried and powdered ; if the flour be mixed with the coconut milk, salt water, fish and herbs, and if the paste be steamed and then ghee be added to it, the cake will indeed be very sweet ; if certain fruits and pungent substances be added to the above, the cake will be of an agreeable taste. If the Odiā flour be mixed with the scrapings of the kernel of the coconut and powdered rice, cummin, pepper and chilly ; if the paste be steamed and the cake be broken and dried, it can be preserved for two months. No other cakes will resemble the above. Sweets are more agreeable to cakes of the above description. If curds, milk, ghee, and coconut milk be added to the paste of the Odiā flour, and be steamed, the cake, when used, has the power of *retinendi seminis virilis in corpore sine pollutione, conferendique facultatem horas in thalamo jugali protrahere*, and increasing muscular strength ; the person will not be reduced by labour.

Toddy if taken daily, will increase one's muscular strength and give a gloss to his person ; if used by children in small quantity it will remove itch and many other diseases. If powdered load-stone and scoria of iron and file be put into the pot that is attached to the incised blossom, and the toddy collected in such a pot be drunk for seven days in the morning.

If shell-lime be put in the pot that should be attached to the blossom, and the toddy be used, hunger, thirst, languor and laziness will be removed, heat in the constitution will be destroyed and coolness be created. Toddy will be very sweet if powdered pepper be put in it and boiled. If toddy be boiled nicely, and if slices of ash-coloured pumpkin be boiled in it.

1303. *Cocos nucifera*, Linn., H.F.B.I., VI., 482 ;
Roxb. 664.

Eng. :—The Coco-nut Palm.

Sans. :—Nārikela, nari-kera, nari-keli, langalin.

Vern. :—Nāriyal (H.); Nārikel, dāb (B.); Narel, nariyéla (Guz.); Narela, narulā, mād, mahad (Mar.); Tenna, tenga (Tam.); Narikadanu, tenkāia, kobbari, erra-bondala, gujju-narekadam (Tel.); Thenpinna, kinghenna, tengina (Kan.); Tenga, kalapa, nyor kalambir (Malā.); Nur (Mysore).

Habitat :—Cultivated in India, Burma, Ceylon. Indigenous in the Cocos Island and North Andamans. (Kurz.)

Mr. O. F. Cook, in his paper on the Origin and Distribution of the Cocoa Palm, published in Vol. VII of Contributions from the National Herbarium, United States of America, brings forward evidence for the American origin of the cocoanut palm. In another paper on the History of the Cocoanut palm in America, published in Vol. 14 of the abovenamed Contributions, he brings additional facts to show that the cocoanut palm was already widely distributed in the New World before the arrival of the Europeans, and that it is not naturally a maritime or humid tropical species, but a native of drier and more temperate plateau regions in South America. (B. D. B.)

An unarmed, erect, tall, handsome, monœcious palm, the greatest beauty of the sea-coast of the Western Peninsula down to Ceylon; not found wild. Trunk 40-80ft., 1-2ft., diam., thickened and ascending at base, inclined black, scarcely forked. Leaves 12-18ft.; leaflets 2-3ft., linear, lanceolate, acuminate, flaccid, bright-green. Petiole 3-5ft., stout, unarmed. Spadix 4-6ft., straw coloured, simply branched, shortly stoutly peduncled; branches flexuous, densely fascicled. Spathe 2-3ft., narrowly oblong, tapering at both ends, glabrous or downy, spilling longitudinally. Male flowers small, yellowish; sepals $\frac{1}{2}$ in., ovate, acute; petals $\frac{1}{4}$ in., oblong-lanceolate; filaments subulate, anthers linear, erect. Female flowers:—few bibracteolate; Sepals about 1 in., concave; petals rather smaller. Ovary tented on an orange coloured disk. Fruit trigonously obovoid, oblong or sub-globose, 6-10 in. long. Endosperm forming a thick white layer of a fleshy fibrous substance adherent to the membranous testa, which again is adherent to the almost stony-black endocarp. The embryo is opposite one pore only. This is the most noticeable character of the fruit. The coir is from the dense fibres beneath the exocarp.

Uses:—"The root is used as diuretic as also in uterine diseases. The ashes of the leaves are used in medicines. The fluid deposited in the interior of the cup is rubefacient and is an effectual domestic remedy for ringworm. (U. C. Dutt). The green fruit is given as a refrigerant, the flowers as an astringent, and the oil employed as a substitute for codliver oil. The milk of the nut, the juice from the flowering spikes, and the tomentum from the leaves are all used medicinally.

Water from the Green Nut.—"The water of the unripe fruit is described as a fine-flavoured, cooling, refrigerant drink, useful in thirst, fever and urinary disorders." (U. C. Dutt.) "It may be drunk to almost any quantity without injury and is considered by the native doctors as a purifier of the blood." (Ainslie.) It is commonly believed in Bengal, however, that too much cocoa-nut milk induces a hydrocele swelling of the scrotum.

The Edible Pulp and the Milk prepared therefrom.—The pulp of the young fruit is nourishing, cooling and diuretic. The pulp of the ripe fruit is hard and indigestible, but is used for medicinal purposes. Ainslie says: "By scraping down the ripe kernel of the cocoa-nut and adding a little water to it, a white fluid is obtained by pressure, which very much resembles the milk in taste and may be used as a substitute for it."

"Dr. Shortt reports having successfully employed the fresh milk.—i.e., the expressed juice of the grated kernel—in debility, incipient phthisis, and cachetic affections, in doses of from 4 to 8 ounces twice or thrice daily. It has a pleasant taste, and may be used as an excellent substitute for cow's milk in coffee; it may thus be advantageously administered even to children. In large doses, it proves aperient, and in some cases actively purgative; hence it is suggested by Mr. Wood as a substitute for castor oil and other nauseous purgatives." (*Pharm. Ind.* 247.)

The following is a prescription known in Hindu medicine as *Narikela-khanda*: "Take of the pounded pulp of cocoa-nut half a seer, fry it in 8 *tolas* of clarified butter, and afterwards boil in 4 seers of cocoa-nut water till reduced to a syrupy consistence. Now add coriander, pepper, bamboo manna, cumin

seeds, nigella seeds, cardamoms, cinnamon, *tejapatra*, the tubers of *Cyperus rotundus* (*mustaka*) and the flowers of *Mesua ferrea* (*nága kesara*) 1 *tola* each, in fine powder, and prepare a confection. Dose 2 to 4 *tolas* in dyspepsia and consumption." (U. C. Dutt, *Hindu Mat. Med.* 248.)

The Shell:—"The cleared shell of the nut or portions of it are burnt in a fire, and, while red hot, covered by a stone cup. The fluid, which is deposited in the interior of the cup, is rube-facient, and is an effectual domestic remedy for ringworm." (U. C. Dutt, p. 248.) The *Bombay Gazetteer of the Thana District* alludes to this in the following words: "The shell, when burnt, yields an oil which is used as a cure for ringworm." "In the Antilles, the cocoa-nut is the popular remedy for tapeworm, and its efficacy has been conclusively demonstrated by medical men in Senegal. A cocoa-nut is opened and the almond extracted and scraped. Three hours after its administration a dose of castor oil is given. The worm is expelled in two hours afterwards. In nine cases in which this remedy was tried by a surgeon in Senegal, the result was complete.—*Natal Mercury*." (*Trop. Agri.*, 1882-83.)

In the Thana district, three oils are prepared from the edible portion or kernel of the nut. These are known as *khobrel*, *avel* and *muthel*. A fourth oil is, however, repeatedly alluded to, namely, an oil prepared from the shell of the nut (*see above*). This last-mentioned oil is perfectly distinct from the oil of the kernel, and is used only in the treatment of ringworm. Its chemical properties have never apparently been determined, nor does it seem to have before this been pointedly made known to European medical authorities as a substance actually prepared and employed by the Indian doctors. It is remarkable that the same properties should be assigned to the shell by the inhabitants of other parts of the world besides India, although they do not apparently distil the oil from it. But of the kernel oils used medicinally, the most conflicting statements have been published both as to their action and mode of preparation. Thus: "A very cheap, hard, white soap is prepared from the oil, suitable for pharmaceutical purposes, such as plaster-making

and the preparation of soap liniment" (Dymock). The *Pharmacopœia*, on the other hand, says this oil is inferior to ground-nut oil and sesamum oil as a vehicle for liniments. Sakharam Arjun remarks: "The fresh oil is prepared for medicinal purposes by boiling the milk of the ripe cocoanut. It is used as an application for burns and in baldness." Ainslie observes it is obtained by boiling the bruised kernels in water, or "on other occasions it is obtained by expression." Drury says: "The oil used internally for medicinal purposes is not the common commercial oil in its crude state, but the oleine obtained by pressure refined by being treated with alkalies, and then repeatedly washed and distilled with water." The therapeutic properties of the oil are discussed in the *United States Dispensatory*. "In Germany it has been used in pharmacy, to a considerable extent, as a substitute for lard, to which, according to Pettenkofer, it is preferable on account of its less tendency to rancidity, its more ready absorption when rubbed on the surface of the body, and its less liability to produce chemical changes in the substance with which it is associated. Thus the ointment of iodine of potassium, when made with lard, becomes yellow in a few days, while if made with cocoanut oil it remains unchanged for two months or more. Vegetable substances also keep better in ointment prepared with this oil than with lard. Besides, it takes up one-third more water, which is a useful quality when it is desirable to apply saline solutions externally." "A preparation has been shown to us, said to be the liquid part of cocoanut oil, prepared in London, and, under the name of *coco-olein*, used, instead of the oil itself, as a substitute for cod-liver oil. The dose of this, as well as of the oil, is half a fluid ounce three times a day."

The various processes adopted in India for preparing oil from the cocoanut result in the formation of substances that are reputed to possess widely different properties. This fact might almost be supposed to be in consequence of chemically different oils being isolated. Dr. Dymock says of the so-called *muthel* oil: "In the Konkan the oil which separates from the freshly-rasped kernel, alone or mixed with tamarind-seed oil,

is used under the name of *mutel* as an application to burns and rheumatic swellings; sometimes black-pepper is added to it." In the *Thana Gazetteer* a somewhat different process of preparing *mutel* (? *muthel*) oil is given. "To make *muthel*, dried kernels are cut into thick pieces and boiled in water. The pieces are then crushed in water and the whole boiled again over a slow fire, when the oil rises to the surface and is skimmed off."

Cocconut oil is said to promote the growth of hair; "hence it is much used as a local application in alopecia and in loss of hair after fevers and debilitating diseases." "The oil is given in plethora and as a vermifuge in Jamaica. It is given while fasting, warmed and with a little sugar, in flux. An emulsion of the oil and kernel is prescribed in coughs and pulmonary diseases generally. Pound the kernel with water, place it to settle, and skim off the cream. This is preferable to the expressed oil."

"Cocoa-nut oil was proposed by the late Dr. Theophilus Thompson (Proceed of Royal Society, 1854, Pt. III., p. 41) as a substitute for cod-liver oil, and in this character it has been favourably noticed by Dr. J. H. Warren (Boston Med. and Surg. Journ., Vol. III., p. 377) and others. The substance used in these cases was not the ordinary commercial oil, but the oleine obtained by pressure from the crude oil (in the solid state it is met with in England), refined by being treated with alkalies, and then repeatedly washed with distilled water. In his Lettsomian Lectures, Dr. Thompson gives the result of his treatment with this agent in 53 cases of phthisis. Of the first 30, 19 were much benefited, in 5 the disease remained stationary, and in the remaining 6 the disease continued to advance. Of the second 23, 15 were materially benefited, 3 remaining stationary, and 5 became worse. Dr. Garrod (Brit. and For. Med. Chir. Rev., Jan., 1856) has shown that it exercises a marked influence, almost equal to cod-liver oil, in increasing the weight of the body. The great advantage of its employment experienced by Dr. Thompson, Dr. Garrod, and also by the Editor, who instituted some trials with it, is, that under its

prolonged use it is apt to induce disturbance of the digestive organs and diarrhœa. Its use is favourably noticed in the Report of Drs. Van Someren and Oswald, and Mr. J. Wood." (Pharm. of India.)

Dr. Dymock says cocoa-nut oil has been tried in Europe as a substitute for cod-liver oil, "but its indigestibility is a great drawback to its general use." Drury observes: "its prolonged use, however, is attended with disadvantage, inasmuch as it is apt to disturb the digestive organs and induce diarrhœa." May it not be that the unfavourable opinions formed by some writers regarding this medicinal oil proceed from the fact that nearly every author describes a different mode of preparing it and, consequently, that it is possible many different substances or a substance in many stages of purity or impurity may have been experimented with? In the Maldives, cocoanut oil is esteemed a powerful antidote against the bite of poisonous reptiles.

The Juice.—The freshly-drawn milk from the young spadix is refrigerant and diuretic, a preparation known as toddy poultice. The fermented juice constitutes one of the spirituous liquors described by the ancient writers. "A tumblerful of the fresh juice is sometimes taken early in the morning on account of its refrigerant and slightly aperient properties." (Dymock.)

Scrapings of the husk—"The outside scrapings of the husk and branches applied to ulcers will cleanse and heal them rapidly if soaked in proof rum; the efficacy of this application was proved by the case of two bad ulcers occasioned by the bite of a Negro's teeth. The young roots boiled with ginger and salt are efficacious in fevers, the same as the bamboo." (Royle.)

The cotton or Tomentum.—"This is a soft, downy, light-brown-coloured substance, found on the outside of the lower part of the branches of the cocoanut tree, where they spring from the stem, and are partially covered with what is called panaday, or coarse vegetable matting of the tree. The cocoanut cotton is used by the Indians for stopping blood, in cases of wounds, bruises, leech-bites, &c., for which purposes it is

admirably fitted by peculiar texture." (Ainslie, Mat. Ind.) Compare with tomentum of *Caryota urens* (and of *Borassus*).

The flowers.—Are sometimes used medicinally, being said to be astringent.

Immature nuts.—These, like the flowers, are often employed medicinally, especially as an astringent in the sore-throats of children.

The root.—"The root is used as a diuretic, as also in uterine diseases." (U. C. Dutt, 248.) It is also employed as an astringent gargle in sore-throat.

The ashes.—"The ashes of the leaves contain an amount of potash; they are used medicinally."

The bud.—The tender buds of this palm, as also of *Borassus* and *Phoenix*, are esteemed as a nourishing, strengthening, and agreeable vegetable.

"The cocoanut milk of the green fruit is a cooling, refrigerant drink, containing albumen and salines. It is a good drink in cholera cases. It succeeds in checking vomiting when other means fail. Cocoanut oil, prepared from fresh pulp, is a good substitute for cod-liver oil. The dose I give is from 20 to 30 minims in the beginning, rising to a drachm thrice daily. An ash is prepared from cocoanut pulp by the Kabirajes which is a valuable antacid and digestive. It is called '*Narkel khond*.' A sweet extract is also prepared, which is used for similar purposes" (R. L. Dutt, M. D., Pubna). "The sweet toddy obtained from this palm is very refreshing and possesses laxative properties. Its continued use (twice or thrice weekly) during pregnancy has a marked effect on the colour of the infant, which is born of a fair complexion,—i.e., if of dark parents, comparatively fair; if of lighter-coloured parents, the offspring generally assumes a European complexion" (Hon. Surg. P. Kinsley, Chicacole, Ganjam). "If the flowers are mixed with sugar, the root of *khus-khus*, and white *chandam*, with a little water, the combination will be found good in bilious fever, will check vomiting, and produce a cooling sensation." (Civil Surgeon William Wilson, Bogra.)

Prof. Pariso, of Athens, records the discovery, by accident, of the tænicidal property of the cocoanut, while he was resident in Abyssinia. On returning to Athens he made a number of observations, which, he says, were most satisfactory, the tæniæ being always passed and quite dead. (*Lancet*, Aug. 18, 1889, p. 341). "When properly prepared and intelligently administered, says a correspondent of the *Times of India*, the cocoanut is equally efficacious with male fern oil, Koussou, pomegranate root or turpentine, whilst it is as pleasant to the palate as they are offensive." (*Ph. J.* Nov. 3, 1888, p. 346.)

Crude cocoanut oil owes its peculiar odour to the presence of a small amount of an essential oil. The principal constituents of this oil are methylheptyl and methylnonyl ketones. A small amount of an aldehyde is also present. The oil therefore resembles oil of rue (*Ruta graveolens*). Under the action of hydrogen at 250°-300°C. in the presence of nickel, methylnonyl ketone yields a hydro-carbon, C_9H_{20} , and a pinacoline $C_{22}H_{44}O$. The hydrocarbon boils at 150°-155°C. at 760 mm. The pinacoline melts at 27°C., and gives an oxime boiling at 233°-137°C. at 15 mm. and a semi-carbazone, m. pt. 225°-227°C. [A Haller and A. Lassieur. *Comptes rend.* 1910, abstracted in *J. Ch. I.*, 15th June 1910, p. 704.]

The use of freshly dried kernels ensures the production of an oil containing little acidity.

Cocoanut oil is a light coloured oil, with a bland taste and a peculiar but not unpleasant odour. In the winter months when the temperature falls to 22° to 24° it solidifies to a white fat. The oil may be easily purified and in this state it forms a favourite edible oil. Cocoanut oil is used in enormous quantities in the manufacture of soaps, made by the boiling process, as also by the cold process; the crystalline character of the fat renders it suitable for toilet preparations. The oil is employed extensively as a vegetable butter and as a chocolate fat. Cocoanut oil resembles palm oil in its chemical composition; like the latter it contains large proportions of trimyristin and trilaurin, smaller quantities of the palmitin, tristearin, and triolein, as also the glycerides of the volatile acids caproic, caprylic and capric. It is practically free from hydroxy acids (Lewkowitsch), and free from butyric acid.

Crossley and Le Sueur (1898) obtained the following constants in oil received from Malabar, Bengal and Bombay: Specific gravity at 100°, 0.903 to 0.904; acid value, 9.9 to 35.2; saponification value, 255.5 to 258.2; iodine value, 8.25 to 8.54; Reichert Meissl value, 6.65 to 6.79; melting point, 23.5 to 25.0; insoluble fatty acids, 82.35 per cent.

Cocoanut oil is rarely adulterated with other fats, and the above tests are usually sufficient for its recognition. (*Agric. Ledger*, 1911-12—No. 5, pp. 167-168).

N. O. PANDANEÆ.

1304. *Pandanus fascicularis*, Lam. H.F.B.I., VI. 485.

Syn :—*Pandanus odoratissimus*, Willd Roxb 707.

Sans. :—Ketaka ; Ketaki.

Vern. :—Keorâ ; ketgi ; gagandhul (H.) ; Keyâ ; ketuki (B.) ; Kenda (Bomb.) ; Keodâ (Mar.) ; Kewoda (Guz.) ; Talum ; tazhai ; thalay (Tam.) ; Mugali, Gâangi, ketaki (Tel.).

Habitat :—Sea coast of the Peninsula, on both sides, Burma, Ceylon seacoast, Andaman and Coco Islands. Common on the sea shore. Gamble says that native women (India) "wear the panicles in their hair." They wear the white bracts also which are more fragrant, I may add. (K. R. Kirtikar.)

Dioecious, gregarious, perennials, much branched. Stem bent, sometimes up to 25ft. high, but more often shrubby, resting on strong aerial roots. Leaves bright or dull-green, but seldom glaucous, 3-5ft. long, caudate, acuminate, always with slightly curved strong spines on edges and mid-rib. Male plant throws out at the end of the branch a spadix with numerous sessile cylindric spikes, 2-3in. long, enclosed by white, fragrant, caudate, acuminate spathes, staminal column $\frac{1}{4}$ - $\frac{1}{2}$ in. long, anthers cuspidate inserted along the whole length of the upper portion (Brandis). The female plant bears no male floral organs. Female spadix solitary, 2in. diam., enclosed in spathiform yellow bracts like those of the male inflorescence, but stricter. Carpels confluent in obpyramidal groups of 6-10 or fewer, green, stigmas short, reniform, yellow ; fruit an oblong or globose orange or scarlet, syncarp 6-10in. long and broad, carpels 2-3in. long, turbinate, angular, confluent, crown smooth, convex, more or less depressed round the reniform stigmas (Trimen).

Uses :—The oil and otto, obtained from the bracts ; are considered stimulant and anti-spasmodic and are administered for headache and rheumatism. A medicinal oil is prepared from the roots. The aerial root is used medicinally by the Sinhalese.

N. O. TYPHACEÆ.

1305. *Typha elephantina*, Roxb. H.F.B.I., VI., 489; Roxb. 648.

Syn :—*Typha angustifolia*, Linn.

Sans :—Eraka.

Vern :—Pater Rāmabāna, (H.); Hoglā (B.); Bora (Kumaon); Kūndar, dib, dab, pitz, yira, boj, lūkh, patira gond, pan, borī (Pb.); Pitz, yira (Kash.); Pun, pollen=būr, būri (Sind); Rāmabāna (Mar.); Ghabajarin (Guz.); Jammu gaddi, emigajunum (Tel.).

Habitat :—Marshes from N.-W. India to Assam and southward, very common in Bombay marshes along the B. B. & C. I. Railway, between Mahim and Dadar. In the Thana District abundant at Bhiwandi and in Banganga River on the way to Chinchani Tarapur. (K. R. Kirtikar.)

Annual marsh herbs. Stems 6-12ft. Leaves erect spongy, 1-1½ in. broad, trigonous above the sheath, margins often undulate above the middle. Flowers bracteolate. Male spike 8-12 in. rachis clothed with short, often forked hairs, bracts 3 or more, anthers, 1-5, 1½ in. long. Pollen 4-globate. Female spike much shorter 6-10 by ½ in. diam. Flowers mixed with clarate pistillodes, bracteoles with fasciate tips much longer than the hairs, which are shorter than the stigmas. Stigmas lanceolate (J. D. H.)

Uses :—The down of the ripe fruit is used as an application to wounds and ulcers, which acts in the same way as the medicated cotton wool.

"The root-stock, which abounds in starch is somewhat astringent and diuretic, and is employed in Eastern Asia in dysentery, gonorrhœa and measles." (Mr. Maiden in Ph. J., 1st Sep., 1888, p. 180.)

N. O. AROIDEÆ.

1306. *Cryptocoryne spiralis*, Fisch. H.F.B.I., VI., 494.

Syn. :—*Ambrosinia spiralis*, Roxb. 623.

Vern :—Nattu-ati-vadayam (Tam.) ; Natti-ati-vasa Tel.).

Habitat :—Bengal, Deccan Peninsula.

A small grass-like herb growing on the margins of ditches and ponds, submerged during the rainy season only. Root-stock tuberos, soboliferous ; roots vermiform. Leaves 3-8 by $\frac{1}{2}$ - $\frac{2}{3}$ in., linear-lanceolate, acute or acuminate, narrowed from the middle to both ends ; nerves nearly parallel ; petiole short, stout. Spathe subsessile, 3-5 in. long ; tube very short, much shorter than the limb, linear-lanceolate, at first twisted, greenish outside, dark-purple and transversely lamellate within. Ovaries 5-6 ; stigmas broadly elliptic. (Cooke).

Uses :—The Ati-vadayam of the Tamils is the Atis of Northern India, and is the tuber of *Aconitum heterophyllum*. The country Atis of the Madras Presidency has for a long time been undetermined, until in 1888 Mr. M. A. Lawson was able to refer it to *Cryptocoryne spiralis* and a species of *Lagenandra*. Moodeen Sheriff says the root bears a strong resemblance externally to *Ipecacuanha*, and he has used it as a tonic and anti-periodic with children. It attracted attention a few years ago through several packages of it appearing in the London market as "False *Ipecacuanha*." It is a well-known drug in Ceylon, where it is employed by the native doctors in decoctions, in combination with other drugs as a remedy for infantile vomiting and cough, and in the case of adults for abdominal complaints and fever. (Dymock).

1307. *Pistia stratiotes*, Linn. H.F.B.I., VI. 497 ; Roxb. 502.

Vern :—Jal-kumbhi, tākāpānā (H. and B.) ; Banjhānjhe (Uriya) ; Prashni, gondāla (Mar.) ; Koddā-pail (Mal.). Antergunga (Dec.) ; Agasatmary (Tam.) ; Anterei-tamara (Tel.).

Eng :—The Wester-lettuce.

Habitat :—Throughout India, in still sweet water.

A floating, gregarious, stemless, stoloniferous herb. Roots of tufted simple white fibres clothed with fibrillæ. Leaves $1\frac{1}{4}$ -4 in. long in Indian forms, apex rounded or retuse, undulate, pubescent above and beneath ; nerves raised beneath, flabelliform,

converging within the margin. Spathe white, obliquely campanulate, $\frac{1}{2}$ in. long, alternately gibbous or tubular and closed below, contracted about the middle, dilated and nearly circular above, tubular below. Spadix adnate to the back of the tube of the spathe, free above. Male inflorescence of few sessile connate. Stamens beneath the apex of spadix, slits vertical, with a ring or confluent minute neuters below them. Female inflorescence a solitary conico-ovoid, 1-celled ovary. Style conical, stigma discoid; ovules many, or thotropous, basal or subparietal. Fruit membranous, few-seeded. Seeds oblong or obovoid, albuminous, testa at length rugose; embryo minute, apical, cuneiform.

The leaves are connected together into a rose-shaped tuft, and these send out runners bearing other plants in all stages of growth.

The flowers, or inflorescence, are nestled at the base of the leaf, and it may easily be seen there, by some of the young unfolded leaves, that the spathe which encloses the flowers is nothing but a modified leaf, the lower sides involute, and bearing the stamens and pistil.

The roots descend loose into the water, with no necessary attachment to soil or mud, and are long and feathery.

In tropical countries it is most abundant in all the ponds of water preserved for public use, and keeps the water always fresh and cool, which would be greatly subject to putrefaction and charged with a multitude of insects, had they continued exposed to the heat of the sun. The plant, however, is there considered acrid, and when the droughts set in and the waters are reduced very low, they are overheated and so impregnated with the particles of this vegetable, that they occasion bloody fluxes to such as are obliged to use them at those seasons. (Curtis' Botanical Magazine for February 1st, 1851.)

Uses:—The plant is cooling and demulcent, and is given in dysuria. The leaves are made into poultices and applied to hæmorrhoids. Mixed with rice and cocoanut milk they are given in dysentery, and with rose-water and sugar in cough and asthma. The root is laxative and emollient. (Rheede; Ainslie; Voight.)

Captain W. O. Swanston, in a letter dated Camp at Tanjore, 2nd July, 1863, to the Assistant Inspector-General, Madras Police, wrote that the plant destroyed most effectually the bugs that invested the Tanjore jail.

"The plant is just put down close to the walls in the floor, and its smell apparently has the effect of enticing the bug to it,

and then of throwing the bug into a state of torpor from which nothing will arouse it. In two or three nights, the jail has been completely cleared of bugs."

The ashes are applied to ringworm of the scalp, and in some parts of India are known as *pânâ* salt. (Watt.)

1308. *Arisæma speciosum*, Mart., H.F.B.I., VI. 500.

Syn.:—*Arum speciosum*, Wall.

Vern.:—Samp-ki-khumb; kiri-ki-kukri, kiralu (Pb.).

Habitat:—Temperate Himalaya, from Kumaon to Sikkim and Bhotân.

Root-stock oblique or shortly creeping and rooting; often 5 in. diam. Petiole very stout, green, smooth, often marbled with brown or purple. Leaf solitary. Leaflets all petiolulate acuminate lateral, dimidiate cordate, median ovate, cuneate or rounded at the base, 16-19 in., edged with red or purple. Petiolule $\frac{1}{2}$ -2 in.; nerves broadly reticulate. Peduncle much shorter than the petiole. Limb of spathe 2-6 in. long banded white and purple; ovate-lanceolate, incurved, caudate, acuminate; tube of spathe 2-4 in., striped with purple, spadix pink or yellowish tail, 12-18 in., dark-purple. Base of appendage not often inflated, usually ovoid, not truncate or disciform. Appendage cylindric or fusiform narrowed into a very long filiform tail. Anther cells 4-5. Ovaries ovoid. Stigma sessile, pulvinate. Very variable in size and colouring.

Uses:—In Hazâra, the root is stated to be poisonous; in Chumba, it is applied pounded to snake-bites. In Kûlû, where the tuber is given to sheep for colic, the fruit is said to have deleterious effects on the mouth when eaten by children. (Stewart.)

1309. *A. tortuosum*, Schott. H.F.B.I., VI. 502.

Syn.:—*A. curvatum*, Kunth. Roxb. 628.

Vern.:—Bir-banka (Nepal); Gurin, dor, kirkichâlu, kirakal, jangush (Pb.).

Habitat:—Temperate and subtemperate Himalaya, from Simla

to Bhutan. The Khasia Hills, Manipore; the Western Ghats, from the Konkan to Malabar.

Tuberous herbs. Tubers spheroidal, attaining 5in. diam. Petiole 1-3ft., green or with the sheaths mottled with purple. Leaves 2-3. Leaflets 8-18in., distant or crowded or almost radiately disposed, sessile or petiolulate ovate-or linear-lanceolate, subcaudately acuminate. Peduncle 2-4ft. Spathe 4-6in., pale-green or purplish, tube subcylindric, tapering, gradually dilating into the limb. The limb incurved broadly cymbiform, acuminate. Spadix uni-or bisexual; appendage like a rat's tail quite smooth, narrowed from the base to the tip erect. Ovary ovoid, attenuated into a short style. Berry 4-5-seeded. A very variable plant.

Collett describes the following two species separately as included by Hooker under *A. tortuosum*. *Schott*—as growing at Simla—(1) *A. curvatum*, *Kunth*:—Male and female flowers on different or on the same plants. Anthers blue or purple. (2) *A. helleborifolium*. *Schott*—Male and female flowers on the same plant, but in very unequal numbers. Anthers white or yellow.

Uses:—It is stated to have poisonous qualities. In Kûlû, the seeds are said to be given with salt for colic in sheep. The root is used to kill the worms which infest cattle in the rains. (Stewart.)

1310. *A. Leschenaultii*, *Blume*. H.F.B.I., VI. 504.

Vern.:—Wal-kidâran (Singh).

Habitat:—Western Ghats, from the Konkan southward. Ceylon.

Monœcious or diœcious. Tuber large, globose 2in. diam. Stem 6in. stout, clothed with long mottled sheaths. Leaf solitary, pedatipartite. Leaflets 5-11-whorled, sub-sessile, lanceolate, serrulate, caudate acuminate, dark-green above, with a stout mid-rib, pale beneath, base acuminate. Petiole stout, 1ft. long, pale-green, irregularly barred or mottled with pale-purple. Spathe emerging from the sheath of the petiole, very shortly peduncled, 6-18in. long, dark-green, externally striped with

pale-green or dull-purple, very dark-green within, tube as long as the limb, narrow, ribbed, erect, gradually dilated into the slightly decurved ovate-lanceolate, acuminate, cymbiform limb which terminates in a filiform clavellate tip, sometimes 3in. long. Spadix up to 3in. long, gradually passing into a very narrowly clavate, pale-green, smooth appendage, longer than the inflorescence, with a rounded, sometimes verruculose top. Anthers 3-4-nate, sessile, with a few subulate neuters above them. Ovaries very many, minute, densely crowded. Colour of spathe very variable (Trimen).

Uses :—The roots are employed as a medicine by the Singha-
lese. (Thwaites.)

1311. *Sauromatum guttatum*, Schott. H.F.B.I., VI.
508.

Syn. :—*Arum sessiliflorum*. Roxb. 628.

Vern. :—Loth (Bombay, according to Dymock); Bhasam-
kand (C. P.).

Habitat :—The Punjab; Upper Gangetic Plain and the Hima-
layas, from Nepal to Simla ascending to 5,000 feet. Found in
the Konkan, abundant in Thana. (K. R. K.)

Root tuberous, large, globose. Stem spotted with purple, sheathed at base by membranous spotted scales. Leaf solitary, appearing after the flower stalk, radical, pedately compound. Stalk 12-18in., spotted. Leaflets 9-11, oblong lanceolate, unequal, more or less sessile at base, very variable in size and shape, the central one 6-13 by 1½-4in., outer ones gradually smaller. Spathe 12-24in. green-purple outside, tube 3-4in., cylindric or globose, inflated, margins united, the inner surface speckled purple on yellow ground, the base deeply purple. Limb lanceolate, narrowed into a long linear curved tip, the inside irregularly blotched with purple and white, the margins purple. Spadix prolonged into a tapering, dark-purple appendage, 6-10in. long. Male and Female flowers on the same plant. Female flowers crowded round the base of the spadix, with a few club-shaped neutral organs above them. Ovary obovate; ovules 1-2. Male flowers crowded in a ring 2-3in. above the

female. Berries scarlet, 1-seeded, in a globose head, more or less enveloped in the withered base of the spathe. Flowers when mature smell of carrion. (Collett.) Of late years the tubers have been sold by most of the bulb growers in England under the name of "Monarch of the East." They are advertised to grow in a warm room, "without water or soil." (B.D.B.)

Uses:—The tubers, which are like small potatoes, are used as a stimulating poultice; they are very acrid." (Dymock.)

1312. *Typhonium trilobatum*. Schott, H.F.B.I., VI. 509.

Syn:—*Typhonium orixenze*, Schott. *Arum orixense*, Roxb. 627.

Vern.:—Ghit-kochu (Beng.); Karunaik-kizhangu (Tam.); Kanda-gadda (Tel.); Chena (Mal.)

Habitat:—Lower Bengal, Burma, the Eastern and Western Peninsula. Ceylon, where it is common in damp places, in moist low country. Often a troublesome weed in cultivated ground, says Trimen.

Tuberous monœcious herb, Stem O. Tuber sub-globose, about lin. diam. Leaves long petioled, hastately 3-lobed, with a truncate or cordate or 2-lobed base, the lobes broad or narrow, sinus sometimes very deep and narrow, or 3-partite, with segments 5-7in. long, the central broadly ovate, acuminate, lateral smaller. Petiole 6-12in. Spathe 3-8in. Peduncle 1-4in., tube oblong or pyriform, much shorter than the broadly ovate, caudate acuminate, expanded limb, which is dull red-purple within, paler externally, with undefined green stripes; spadix 2-4in., sessile, erect, male inflorescence cylindric, female very short, surmounted by a dense mass of filiform tortuous neuters, $\frac{1}{2}$ in. long, interspace between the neuters and male inflorescence naked; appendage shortly stipitate, slender, striate, acute or obtuse, red, base truncate; anthers minute; ovaries crowded in a hemispheric mass, stigma pulvinate. (Trimen.)

Uses:—The roots are exceedingly acrid, and used in poultices; and also applied externally to the bite of venomous

snakes, at the same time given inwardly about the size of a field bean. It is certainly a most powerful stimulant, in proper hands it might no doubt be used to great advantage in the cure of several disorders. (Roxburgh). Dr. Waring remarks that any good effect which could be expected from it, may, however, be more readily obtained from a mustard poultice. The acrid principle is very volatile; and by the application of heat, or by simple drying, the root becomes innocuous or even wholesome as articles of diet (Ph. Ind.). As an article of food, it relaxes the bowels and thereby relieves hæmorrhoids. The wild plant is used as a medicine for plies (T. R. Moodeliar).

1313. *Amorphophalius campanulatus*, Blume, H.F.B.I., VI. 513.

Syn. :—*Arum Campanulatum*, Roxb. 629.

Sans. :—*Arsaghna*; Kanda.

Vern. :—Jangli-surān, Zamin-kand (H.); Ol (B.); Suran (Mar.); Karu-naik-kizhangu, or karuna-kalang (Tam.); Kanda-godda, poti-konda, manchik-anda (Tel.).

Habitat :—Cultivated throughout India.

A perennial stemless herb, with tuberous roots, often 1½ ft. in circumference, flowering before leafing every year from the previous year's tuber. The tuber is really and truly an underground stem which bears only one spathe-included spadix, after the maturation of which what looks like a stem above-ground is merely the petiole radically developed from the depressed portion of the globose tuber side by side with the spathe and spadix. The tuber has sometimes many bulbils, each of which gives forth no spathe nor spadix, but only a petiole with leaves. Petiole of the main bulb which has flowered already varies in height from 1½-2½ ft. in cultivated varieties, often 4 ft. 2-4 in. thick, rough, clouded dark and light-green, cylindric, softly fleshy, succulent. Leaf formed of the three radiating horizontal divisions of the petiole, 1-3 ft. broad. The divisions are dichotomous, pinnatisect, with a deep channel on the ventral aspect, roundish on the dorsal aspect, slightly scabrous. There

are membranaceous wings along the sides of the decurrent bases of the segments. Segments lanceolate or ovate-lanceolate, parallel-veined, pale green, entirely glabrous; margins entire. Scape solitary, 2-4 in. long, cylindric, greenish, mottled with white spots, very thickly verrucose, invested below with 2 or 3 imbricated scales or bracts, linear-lanceolate, tough, fleshy, rose-coloured, mottled with green or purple spots. Spathe large, leathery, marescent,* large ovate, 1-1½ ft. long, very broad, erect; below, of fleshy substance, infundibuliform, convolute; above membranous, broadly campanulate, patulous, with undulate curled margins. The convoluted part, in its greatest circumference, is about 1½ ft.; externally, speckled with bright green dots and pale yellowish-greenish dots; internally, purple at base, with very thick fleshy warts thickest and deepest-coloured near the scape, paler and less dense as they approach the mid-part of the infundibular portion; the mid-part is conspicuously greenish-yellowish, without any warts. Spadix projecting distinctly beyond the spathe, erect, thick, club-shaped, almost half-way from below cylindrical and pistil-bearing, thence upward it is pear-shaped and thick, bearing anthers; above this part lies the apical appendage or club, expanding into a globosely conoid, irregularly formed mass when young, which becomes fungating and sinuously lobed as it matures. The texture internally is spongy, fibrous, lacunose, externally corrugated, brownish-purple, resembling soft leather, with minute warts or projections alternating in regular order with shallow depressions between. As the conoidal apex matures into the more corrugated mass of sinuous small lobules, they emit an intolerable offensive odour of putrid flesh, inviting hordes of blue-bottles and other large flies which cover the whole mass with their eggs; and the subsequent maggots which thickly beset it for next four or five days, render the flowerstalk as disgusting to the eye and nose as carrion. Flowers unisexual, the males on the middle third of the spadix immediately below the appendage; the females on the lower

* That is, not actually falling off before the spadix is perfected, but withering long before that time.

third or basal part of the spadix. Perianth absent, male and female flowers contiguous, *i. e.*, having no neuters between. Male-Stamens numerous, dense. Anthers 2-celled, sessile, close-packed, compressedly cylindrical; rounded at the top; straw-coloured; glabrous. Connective, longitudinal, fleshy, separating the two loculi. Pollen globose, lemon-yellow, or almost orange-coloured, "vermiform," says Trimen. Female flowers:—pistils numerous; somewhat loosely and spirally arranged; stigma 3-lobed, often 2-lobed, all on the same level; much thickened and expanded, slightly papillose, cream-coloured or yellowish. Style crimson or purplish, $\frac{1}{4}$ – $\frac{1}{2}$ in. long, much longer than ovary, deciduous. Ovary, 2-rarely 3-celled, with only 1 ovule; purple or deep crimson; broad, globose. Ovules attached to the inner angle of the carpel at its base, ascending, ovoid, anatropous. "Berries 2-3-seeded, red," says Trimen. But not known ever to have developed in the Western Peninsula and the Dekkan, where it is much cultivated for its tubers. (K. R. K.)

It must be noted here that the wild or uncultivated variety of *Amorphophallus campanulatus* is entirely different from the tuber of *Amorphophallus sylvaticus** (Kunth), which is also locally named Jangly-Suran, and described by Dr. Dymock under that name in the *Pharmaceutical Journal* (p. 172, vol. vii, 3rd Series). Dr. Dymock was well aware of this fact at the time he first described this plant, for he has since repeated his remarks in his later works,—viz., "The Vegetable Materia Medica of Western India" and "The Pharmacographia Indica"—that "it is probable the two plants are distinct," for he adds that "it is probable the roots of the wild *Amorphophallus campanulatus* form a part of the commercial article known as Madanmast, which is the tuberous root of *Amorphophallus sylvaticus*, peeled, cut into slices and strung upon a string." (K. R. K.)

Uses:—The corm (or tuber) and the seeds are used as irritants and relieve the pain of rheumatic swellings when applied externally. It is considered a hot carminative in the form of a pickle. The tubers contain a large quantity of farinaceous matter, mixed with acrid poisonous juice, which may be extracted by washing or heat. When fresh, it acts as an acrid stimulant and expectorant, and is used in acute rheumatism.

*Synonyms.—(I) *Synantherias sylvatica* (Schott.)—Hooker's *Flora Br. Ind.*, art XIX, page 517: (II) *Arum silvaticum* (Warden and Pedler's article on the nature of the toxic principle of the Aroideæ.—*Journal As. Soc., Bengal*, vol. LVII, part 2, No. 1.)

The tubers contain an acrid juice which should be got rid of by through boiling and washing, otherwise the vegetable is apt to cause troublesome irritation in the mouth and fauces. Medicinally it is considered serviceable in hæmorrhoids; in fact, one of its Sanskrit synonyms is *arshghna*, or the curer of piles. It is administered in this disease in a variety of forms. The tuber is covered with a layer of earth and roasted in a fire; the roasted vegetable is given with the addition of oil and salt. (U. C. Dutt.)

It has a mucilaginous taste and is faintly bitter,* and acrid; it is supposed to have restorative powers and is in much request. (Dymock).

The root used in boils and ophthalmia; also as emmenagogue (Lindley).

Dr. Nasarvanji Fakirji Surveyor, M.D., B.S.C., M.A., M.R.C.P., a distinguished Graduate of the Bombay University, writes: "The wild variety (under microscope) shows two forms of crystals, while the cultivated variety shows only one form. I shall first describe those crystals which are found in both the varieties and then those found in the wild variety only. Those found in the former I shall call the white crystals; while those found in the latter or wild variety only will be described as brown crystals. The white crystals are about 120μ † in length and 3μ in thickness. They are acicular and glistening and have a double contour. They are sharp-pointed at either extremity and always straight. They appear to be rigid; more numerous in the older parts, while they are almost absent from the youngest part (e.g., leaf-bud). They are insoluble in cold water; slightly soluble in boiling water. Acetic acid dissolves them with evolution of gas (CO_2 probably).

"On incinerating a thin film of the juice on a slide, these crystals were found to be fractured in numerous places, while many appeared to be either transversely striated or granular. This was due perhaps to the fact that the water of crystallization was driven out by the heat. These crystals were found to be scattered about, not collected in definite bundles. They were probably carbonate of calcium.

"The brown variety was only found, as has been already remarked, in the wild *Amorphophallus*. These crystals were very fine; about one-third the size of the first. They were also acicular, but did not show a double contour. They were found in the cells arranged in sheaves, and were distinctly brown when viewed in a mass. On adding a drop of water to the juice of the tuber, these cells swelled up and discharged the crystals. When examined singly, the

* It is not at all bitter. It is the tuber of *Sauromatum guttatum*, Schott, which is bitter, and therefore known in the Thana District as Bitter suran.—K.R.K.

† $\mu = \frac{1}{1000}$ of a Millimetre.

crystals appeared to be very thin and somewhat curved. The brown tinge was still noticeable. The length of each crystal is $50\ \mu$, and thickness under $\frac{1}{4}\ \mu$. The crystals are sparingly soluble in warm water, freely in boiling water, so that a piece of the wild variety, on being reduced to pulp and boiled with distilled water, was almost deprived of the crystals, while the white crystals were still seen. By filtering the hot water, brown crystals were obtained from the filtrate by evaporation. Is it a fact that the wild variety can be eaten, if well boiled, especially with salt?

"On incinerating the piece just as described above, I found that these crystals were not altered in the slightest manner, thus proving that they too were inorganic in nature and that they were not oxalates.

"Acetic acid dissolved them without evolution of gas. These were probably sulphate of calcium crystals; however, I am not certain of that. I examined pieces of both the varieties for other salts after charring and incinerating them. This method showed insoluble and soluble carbonates, soluble sulphates and traces of chlorides.

"Of course, sulphate of calcium, being a poisonous salt, must have something to do with the properties of the wild variety; however, it is perhaps not the only cause; a glucoside or an alkaloid may be present too. As I have neither the means nor the time at my disposal, I am not able to settle that point.

"The important facts, however, are that the brown crystals are only present, as far as I know, in the wild variety, and that they are soluble in boiling water and weak acids, without evolving any gas like the white crystals. These are very delicate, and appear in places to be slightly bent; while the white crystals are rigid, straight, and thicker."

1314. *Synantherias sylvatica*, Schott, H.F.B.I. VI. 518.

Syn. :—*Arum sylvaticum*, Roxb. 630.

Sans. :—Vajra-kanda.

Vern. :—Uzomut (Goa); Wajramuta (Mar.).

Habitat :—The Deccan peninsula, from the Northern Sircars, the Concan and southwards to Ceylon.

Tuberous herbs. Tuber 1-2½ in. diam, subglobose bulbiferous. Leaves long petioled, a foot broad or less, divisions 1-2-pinnatifid; leaflets few, ovate-lanceolate or oblanceolate, acuminate or caudate, 5-6 in. long, lower on the divisions smaller; petiole 6-18 in., pale-green, streaked with darker green; peduncle up to 8 in. long, pink, clouded with dirty green, basal sheaths, short, scarious, pale-pink (Trimen). Hooker says "petiole and peduncle 1-2 ft." Spathe 1-3 in. long, pale-pink,

spotted with green, purple within towards the base. Spadix up to 10in. long, erect, appendage up to 7in., by $\frac{3}{4}$ in. diam.; but often more slender, sometimes tapering from the middle to base and apex, purple, smooth. Male flowers of scattered or fascicled minute sessile obcuneate anthers (J. D. H.) Anthers in groups of 4-6, purple or pink; ovary globose, green, stigma yellow; style very short, neuters as large as the groups of stamens or larger oval or oblong, disciform, pale, shining. Male and female inflorescence distant, with the oblong depressed interposed neuters.

Uses:—The country people use the crushed seed to cure toothache. A small quantity is placed in the hollow tooth and covered with cotton; it rapidly benumbs the nerve; they also use it as an external application to bruises on account of its benumbing effect. In the Concan, the seeds rubbed into a paste with water are applied repeatedly to remove glandular enlargements. The taste of the fruit is intensely acrid; after a few seconds it causes a most painful burning of the tongue and lips, which lasts, for a long time, causing much salivation and subsequent numbness. (Dymock.)

1315. *Plesmomum margaritiferum*, Schott,
H.F.B.I., VI. 518.

Syn.:—*Arum margaritiferum*, Roxb. 630.

Vern.:—The Goa name of the plant is Azomut or Uzomut. (Dymock).

Habitat:—Bengal (Roxb.); Serampore (Bentham); Dacca (Clarke); Asnora in the Goa territory (Dymock); Hindustan.

Tuberous herbs. Tuber 6in. or less, bulbiferous all over. Leaves $1\frac{1}{2}$ ft. diam., 3-sect, segments pinnatisect, lateral forked; leaflets few, 4-6in., linear, acuminate. Petiole $1\frac{1}{2}$ -2ft. green. Peduncle 12-18in., stout, pale-green, streaked with darker green. Spathe 5-6in. by 4in. broad, erect, broadly ovate, obtuse, concave, loosely convolute; below the middle, pale yellow-green, flushed with pink within, dark-purple at base. Spadix very stout, stipitate, obtuse, as long as the spathe; male inflorescence much the longest; neuters as large as peas, white,

interposed between the distant male and female inflorescence respectively; no appendage. Anthers crowded, very short, pores confluent. Ovaries scattered, globose, narrowed into a short style. Stigma large, 2-3 lobed. (J. D. Hooker).

Uses:—"The country people in Goa use the crushed seed to cure toothache; a small quantity is placed in the hollow tooth and covered with cotton; it rapidly benumbs the nerve; they also use it as an external application to bruises on account of its benumbing effect." (Dymock).

1316. *Remusatia vivipara*, Schott. H.F.B.I., VI. 521.

Syn.:—*Arum viviparum*, Roxb. 625.

Vern.:—Maravara Isjembu (Mal.); Rukh-alu (Mar.).

Habitat:—Subtropical Himalaya. The Khasia Hills. Behar, on Parasnath. The Western Ghats.

Tubers 1-1½ in. in diam., clustered, depressed, rooting from the crown; bulbiferous shoots 6-12 in. long, as thick as a goose quill, simple or shortly branched, ascending, flexuous, bearing at the nodes clusters of oblong, squarrosely scaly bulbils ¼ to ½ in. long. Leaves peltate, 5 by 3½ to 18 by 12 in., membranous, orbicular-ovate or cordate, acute or acuminate, with strong main nerves and fine venation between them; petiole 6-12 in. long, with a short sheath. Spathe 4-5 in. long, coriaceous; tube 1-2 in. long, oblong or ovoid, green; limb 2-3 in. long, broadly orbicular-ovate or ovate-cordate, 2-3 in. broad, golden-yellow. Spadix 1-1½ in. long; the male inflorescence ½ in. long. The plant rarely flowers, but sends up long bulbiferous shoots from the crown of the tuber.

Uses:—The root is made into an ointment with turmeric and used as a remedy for itch; and the juice with cow's urine is considered to be alexipharmic. (Rheede.)

1317. *Alocasia Antiquorum*, Schott, H.F.B.I., VI. 523.

Syn.:—*Arum Colocasia*, Willd. Roxb. 624.

Sans.:—Kachchi, katchû, kachwi, kachwæ.

Vern. :—Kachu, arvi, ghuiyân, cham-kure-ka-gaddah (Hind.); Kochu, ashu-kochu, bun-kochu, guri. (Beng.); Dzu (cultivated) and kirth (wild), (Angami Naga); Rab alu, kachalu, gandiali, arbi, kasauri gagli, ghuyan (Pb.); Alu, Kasalu (Mar.); Saru (Uriya); Shimak-kizhangu, shima-ikilangu (Tam.); chama-kura, châma gadda, chama-dumpa, chema (Tel); Chempa-kizhanna, kaladi (Mal.); âvi-gadde, keshavanga-gadde, (Kan.).

Habitat :—Throughout the hotter parts of India, wild as well as cultivated. Ceylon.

A tall, coarse herb. Root-stock tuberous, about 6in. in diameter, short or elongating underground for several feet, giving off long sheathed bulbilliferous runners from the base. Leaves 6-16in., dark green, sometimes clouded with black, bifid half way from the base to the insertion of the petiole, basal lobes rounded, mid-rib beneath very stout, penniveined, with 5-7 veins radiating from the top of the petiole, which is 3-4ft. long, green or violet, sheath narrow. Spathes solitary or fascicled, stoutly peduncled, 8-12in. long, erect, narrow, green, tube 2-3in., narrowly ellipsoid, limb erect, lanceolate, acuminate, convolute, caudate, acuminate. (J. D. Hooker). Spadix about half as long as the spathe, slender, appendage 1-3in., cylindric or subulate; male and female inflorescence each about 1½in. long, separated by an interval covered with flat oblong neuters. (Trimen.) Every part edible.

Uses :—The pressed juice of the petioles is styptic, and may be used to arrest arterial hæmorrhage. Dr. Bholanath Bose reports very highly in favour of this property, and states that the wound heals by first intention after its application. (*Pharm. Ind.*) It is sometimes used in earache and otorrhœa, and also as an external stimulant and rubefacient. "The juice expressed from the leaf stalks is used with salt as an absorbent in cases of inflamed glands and buboes. The juice of the corm of this species is used in cases of alopæcia. Internally, it acts as a laxative, and is used in cases of piles and congestion of the portal system, also as an antidote to the stings of wasps and other insects." (Dr. Thornton in Watt's Dic.).

A microscopic examination of a section of a tuber revealed the presence

of very numerous bundles of needle-shaped crystals, and we also found similar crystals in the leaves and stems. These crystals were seen under the microscope to be insoluble in cold acetic acid, but easily soluble in cold diluted nitric or hydrochloric acid." "There appears to us to be no reason to doubt the fact, that the whole of the physiological symptoms caused by Arums are due to these needle-shaped crystals of oxalate of lime, and that the symptoms are thus due to purely mechanical causes. Bearing in mind the action of re-agents on calcic oxalate, the reason why mere boiling in water failed to deprive them of their activity is explained by the insolubility of oxalate of lime in water. Again, the action of dilute acetic acid, even at temperatures of 100° C., in slightly lessening the activity of the tubers, is due to the very slight solubility of oxalate of lime in that acid. And, lastly, the complete loss of all physiological action when the tubers were treated with dilute nitric or hydrochloric acid is evidently due to the ready solubility of calcic oxalate in those mineral acids. And these assumptions, as we have already indicated, were fully demonstrated by the microscopic examination of sections of the tubers treated with the reagents we have mentioned. One point, however, remains to be explained: we observed that, on drying, the tubers lost practically the whole of their physiological activity. Clearly there could have been no loss of oxalate of lime on desiccation, and, as a matter of fact, we found as many crystals on microscopic examination of dried Arums as we had found in the fresh tubers. We explain this apparent anomaly in the following simple manner. In the fresh condition of the tubers, the bundles of crystals of oxalate of lime are cone-shaped, more or less, the sharp points covering a wide area, and forming the base, but, in the drying of the tubers, the needles appear to arrange themselves more or less parallel to one another, and the sharp points thus cover a smaller area. And thus, instead of each crystal acting as a separate source of irritation and penetrating the tissues, the bundles act as a whole." (Warden and Pedler).

1318. *Alocasia Indica*, Schott., H.F.B.I., VI. 525.

Syn.:—*Arum indicum*, Roxb. 625.

Sans.:—Mānaka.

Vern.:—Mānakanda (H.); Mānkochu (B. and Ass.); Alū (Mar.).

Habitat:—Generally cultivated around the huts of the poorer classes in Bengal.

Tuberous tall coarse herb. Stems attaining 8ft. stout, 3-8in. diam., emitting bulbiferous suckers. Leaves 2-3ft. large, ovate deeply and sagittately cordate repand, lobes rounded very shortly connate, sinus narrow, nerves about 8 pair, petiole stout transversely clouded. Peduncles (always in pairs, Roxb.) shorter than the petioles. Spathe 8-12in., pale-yellow, green; tube

many times shorter than the very long linear oblong subtruncate cuspidate limb. Spadix equalling the spathe. (J. D. Hooker.) Appendage longer than the inflorescence. Ovary 1-celled, stigma sessile 3-4 cleft.

Uses :—Medicinally it is said to be useful in anasarca. The flour obtained by pounding the dried stems boiled with rice flour until all the water has evaporated, is given to the patient and no other food allowed.

"As a food taken frequently, it seems to act as a mild laxative and diuretic. In piles and habitual constipation it is useful." (Surg. D. Basu, Faridpur.) "The flour of old dried stems is a valuable article of food for invalids. It is an excellent substitute for arrowroot and sago in place of which I have used it in many instances." (Asst. Surg. Shib Ch. Bhutt, Chanda). "The ash of the root-stocks mixed with honey is used in cases of aphthæ." (Asst. Surg. Anund Ch. Mukerji, Noakhally.) —Watt's dictionary.

In an interesting paper on the "Use of Manmanda in Indian Therapeutics and its probable explanation," Dr. Lal Mohan Ghoshal writes in *Foods and Drugs* for April 1913, as follows :—

Composition and preparation of Manmanda.—The kochu of at least one year's standing is taken, dried and pulverised into fine powder; this is then prepared with rice into pasty mass by boiling; this paste is sufficiently macerated and filtered through fine muslin. The filtrate is then allowed to be taken as food. The composition of such a manda is the following :—

Protein—1.78 p. c. (increase in protein is due to the addition of rice); Carbo-hydrate—20.21 p. c.; Moisture—77.27 p. c.; Fat—a trace only.

The filtrate is a syrupy paste, slightly acid or unpleasant in taste; reaction for calcium oxalates can be obtained by filtering the paste through a filter paper and evaporating the watery portion.

This is all about the composition of man-kochu and the preparation of manmanda.

The question now arises, what is there in the manmanda that leads the kabirajas to use the manmanda so indiscriminately in all sorts of cedema and dropsy. Generally from 4oz to a pint of the manda is given according to the strength of the patient; if the patient is strong and the cedema is of recent origin the treatment is mainly directed to the starvation of the patient, strict regulation of water (sometimes it is altogether cut off) and administration of about 8oz of the manda; if the patient is weak and has got a good deal of thirst associated with fever, manmanda about a pint is

allowed with stimulating drinks made of infusions of various drugs (pānchan), and a little hot water is allowed to be sipped at definite intervals. Salts are entirely cut off.

From what is stated above we see that about 4 to 10 grams of protein and 50 to 120 grams of carbo-hydrates are allowed by the administration of manmānda according to the strength of the patient; but in these we see nothing that tends particularly towards the relief of œdema, although we see that considerable improvement is done by this treatment. It must be, then, that manmānda is administered not particularly for its nourishing property, but for something else. It may be possible that it is administered for the calcium oxalate that is present in the manmānda. This oxalate has probably the property of relieving the œdema caused by the retention of salts. It is now generally accepted that the œdema is mainly due to the retention of salts, particularly sodium chloride; and the oxalate has probably the property of removing this retention and thereby relieving the consequent œdema. The following experiments were done to show that the calcium oxalate has such property when administered both in normal individual and in œdematous persons:—

PART II EXPERIMENTAL.

Laboratory Experiments.—A solution of sodium chloride is precipitated by a solution of oxalates; the precipitation is more marked by the addition of a solution of calcium oxalate.

Experiments on healthy individuals.—Two persons were selected and their urines were examined under normal conditions, and under different conditions after the administration of calcium oxalates. * * * *

From the above experiments we see that by the administration of calcium oxalate, the chloride excretion is positively increased, the quantity of urine as well as the urea excretion is also increased; with 5 grams the quantity of urine is rather comparatively decreased, but the increase in chloride and urea excretion is maintained. The increase of chlorides is positively more than what is ingested. Even with a diet having no chlorides, the urine showed an excretion of 2 grams of the chloride. Watery part in this latter case is considerably diminished, probably owing to less consumption of water which is necessary only to maintain the osmotic equilibrium when salts are ingested with the diet. Urea excretion is also less, for the reason that it is difficult to take proper amount of food without salt and nitrogenous metabolism is consequently rather low.

Thus we see that with the administration of calcium oxalate the chlorides and urea, particularly the former, are definitely increased.

1319. *Homalomena aromatica*, Schott., H.F.B.I., VI. 532.

Syn. :—*Calla aromatica*, Roxb. 630.

Vern. :—Kuschu gundubi (B.).

Habitat :—Assam; Chittagong.

Herbs. Leaves 6-12 in. broad, cordate or sagittately cordate, acuminate, basal lobes divaricate. Spathe green, obtuse 2-4 in. long, not contracted above the female inflorescence. Spadix included male and female inflorescence close together, cylindric. Stamens distinct in dense groups. Seeds small, ovoid, albuminous. Embryo axile.

Uses :—The large rhizome, which is invested with the old withered leaf-scales, bears numerous white long rootlets issuing from its surface, and is said to be held in high estimation by the natives as an aromatic stimulant. (Watt.)

1320. *Scindapsus officinalis*, Schott., H.F.B.I., VI. 541.

Syn. :—*Pothos officinalis*, Roxb. 145.

Sans. :—Gaja-pippali, kari-pippali, kapi-balli, kola-balli, greyasi, vaśira.

Vern. :—Gajapipal, Hati-pipli, baripipli (H.) Gajapipal, (B.); Dare jhapak (Santal); Thora-pimpli (Mar.); Motto-pipar (Guz.); Atti-tippili (Tam.); Enuga-pippalu, gaja-pippallu (Tel.); Dodda-hipalli (Kan.); Attitippili, anait-tippili (Mal.).

Habitat :—Sal forest of the Siwalik, trailing on trees by suckers from nodes very common in the Dudhli Block. Tropical Himalaya, from Sikkim eastward. Bengal, Chittagong, Burma and the Andamans.

A forest plant, fleshy, climbing shrub, herbaceous, perennial. Stem reaching 1 in. or more in diam.; annulate. Leaves 5-12 by 2½-6 in., dark-green, ovate or elliptic-ovate, alternate, caudate-acuminate; base rather obliquely rounded or subcordate; petiole 2-6 in. long, elbowed at tip, sheathing amplexicaul. Spathe yellow within. Berries fleshy, ovoid or lanceolate, about 6 in. long. (Kanjilal.) Seed ovate-cordate.

Fruiting spadix sometimes a span long. (J. D. Hooker.) The stem is traversed by a strong fibre which is easily separated and can be used for various purposes. Leaves eaten as a vegetable. (Kanjilal.)

Uses :—The dried fruit is a stimulant, diaphoretic and anthelmintic (*Ph. Ind.*) By Sanskrit writers it is said to be aro-

matic and carminative, and useful in diarrhoea, asthma and other affections caused by deranged phlegm. (U. C. Dutt.)

Among the Santals the fruit is applied externally for rheumatism. (Revd. H. Campbell.)

1321. *Rhaphidophora pertusa*, Schott., H.F.B.I., VI. 546.

Syn. :—*S. Pertusus*, Schott. *Pothos pertusus*, Roxb. 145.

Vern. :—Ganeskanda (Mar.).

Habitat :—The Dekkan Peninsula; Coromandal, Malabar; Ceylon rather rare.

A tall perennial climbing shrub rooting on trees. Stem cylindric 1½ in. diam., green, smooth, leafy for the greater part of its length. Leaves 8-18 in. long, and 6-10 in. broad; young small, ovate, entire; old pinnatifid to below the middle or perforate, base truncate or subcordate, lobes few, broad, falcate, acuminate, primary nerves 5-8 pairs connected by anastomosing veinlets. Petiole about as long as the blade deeply channelled, young winged, wings not auricled at top, basal sheaths 4-5, oblong, obtuse, brown. Spathe shortly stoutly peduncled, yellow, 5-7 in. ovate-oblong or cylindric, cymbiform, acuminate, or cuspidate. Spadix sessile, shorter than the spathe, very stout, cylindric, ¾ in. diam., top rounded. Flowers hexagonal. Stamens 8; filaments very stout, sometimes bifid; anthers small. Ovary 6-gonous. Stigma linear, raised on a short stout style. (Trimen.) The ovary is 4-angled, stigma sessile, pulvinate, says J. D. Hooker.

A closely allied plant, says Trimen, cultivated in gardens always, has perforated leaves.

Uses :—The juice of the plant with black pepper is given to people who are bitten by *Kusreyia ghannas* (*Daboia russellii*, a viper), a snake so called because the part bitten by it mortifies. The juice, with that of the roots of *Croton oblongifolium*, and of the fruit of *Momordica charantia* is also applied to the bitten part. (Dymock.)

1322. *Lasia heterophylla*, Schott., H.F.B.I., VI. 550. Roxb. 147.

Vern. :—Kanta-kochû (B.) ; Kanta saru (Santali) ; Mulasari, kanta-kachoramu (Tel.).

Habitat.—Found from Tropical Sikkim Himalaya, Assam, Bengal, Burma, Singapore. Rather common in low moist country in Ceylon. Not in Peninsular India, (K. R. K.).

Root-stock creeping, lin. diam. Leaves 6-18in. long, rigidly coriaceous, young hastate or sagittate, old pinnatifid, segments lanceolate, acuminate, smooth above, beneath costate, and strongly penniveined, mid-rib and veins naked or spinous beneath. Petiole 2-4ft., terete, base sheathing. Spathe 8-14in., spirally twisted above the spadix, about as thick as the little finger, acute, green or yellowish, margins very dark-purple except at the base, open at base only when the pollen is being discharged, closing afterwards. Spadix about lin., claret coloured, fruiting 4-5in., and lin. diam. Flowers sessile, perianth-segments 4-5, concave, dorsally hooded, dull pink ; filaments very broad, anther-cells oblong, divaricate below ; ovary short, columnar, green, stigma large, sessile, pulvinate, pink. Fruit an oblong or capitate syncarp 2in. diam., of muricate berries, $\frac{1}{2}$ in. diam. Root-stock eaten in famine times. (Trimen.)

Uses :—The root is highly esteemed by the Santals as a remedy for affections of the throat. (Campbell.)

The leaves and roots are also used medicinally by the Singhalese.

1323. *Acorus calamus*, Linn. H.F.B.I., VI. 555. Roxb. 296.

Sans. :—Vâchâ (talking), shadgrantha (six-knotted), ugragan-dha (strong-smelling), jatila (having entangled hair).

Vern. :—Bach, gor bach (H.) ; Bach (B.) ; Gandilovaj, goda vaj (Guz.) ; Vekhand (Mar.) ; Bariboj ; warch (Pb.) ; Vashambu (Tam.) ; Vasa, wasa, wadaja (Tel.) ; Vashampa (Mal.) ; Baje (Kan.)

Habitat :—Cultivated in damp, marshy places in India ; exceedingly common in Manipur and Naga Hills.

An aromatic marsh herb. Root-stock creeping, very aromatic and branching, as thick as the middle finger. Leaves with a stout mid-rib, 3-6in. by $\frac{2}{3}$ -1 $\frac{1}{2}$ in., bright-green, acute, thickened in the middle, margins waved. Spathe 6-30in. long, pedicel (formed often connate pedicels and spathe) 1 $\frac{1}{2}$ -1 $\frac{1}{4}$ in. broad. Peduncle $\frac{1}{8}$ - $\frac{3}{8}$ in. broad, leaf-like. Spadix 2-4in. by $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. obtuse, slightly curved, green. Sepals as long as the ovary, scarious. Anthers yellow. Fruit turbinate, prismatic, top pyramidal.

Uses :—The aromatic rhizome or root-stock is considered emetic in large doses, and stomachic and carminative in smaller doses. (U. C. Dutt.) It is a simple useful remedy for flatulence, colic, or dyspepsia, and a pleasant adjunct to tonic or purgative medicines. It is also used in remittent fevers and ague by the native doctors, and is held in high esteem as an insectifuge, especially for fleas. In Voigt's Hortus Suburbanus Calcuttensis occurs the following (taken from Thomson's Mat. Med.) : "The root has been employed in medicine since the time of Hippocrates. By the moderns it is successfully used in intermittent fevers, even after bark has failed, and it is certainly a very useful addition to Cinchona. It is also a useful adjunct to bitter and stomachic infusions." It is also much valued by the Manipuris, especially in the treatment of coughs or sore-throats. For this purpose a small piece is chewed for a few minutes. It contains a bitter principle, acorine and an alkaloid calamine, useful in dysentery (I. M. G. 1875, p. 39.)

The root used by the free Indians of Hudson's Bay territory in coughs. Mr. Holmes remarks that "it is not a little singular that there is hardly a country where this plant grows that the rhizome is not used in medicine. (Ph. J. Oct. 18, 1884, p. 302.)

"In Meerut the rhizome, with bhang and ajowain in equal parts, is powdered and used as a fumigation in painful piles." (Surg.-Maj. W. Moir and Asst. Surg. T. N. Ghose, Meerut.) "I found the root extremely useful in the dysentery of children, and also in bronchitic affections—*vide* Ind. Med. Gaz. for

Feb. 1875, p. 39, for further particulars." (Surg. B. Evers, M.D., Wardha.)

As a stomachic in flatulency, in the form of infusion,

Bruised root	...	...	...	1 oz.
Boiling water	...	...	...	14 "

Dose : 1 ounce and a half thrice daily. (Surgeon C. M. Russell, Sarun.)

"The root, rubbed up with water or spirit, is used as a counter-irritant to the chest in the catarrh of children. It is generally supposed that the smell is disliked by the cobra, on which it produces a narcotic effect. For this reason it is cultivated near dwellings and chewed by snake-catchers." (Surgeon H. McCalman, M.D., Ratnagiri.) "Bach is commonly used to allay distressing cough. I use it much for this purpose, with excellent results. A small piece of the dried root-stock kept in the mouth acts better than many cough lozenges. It produces a warm sensation in the mouth and a beneficial flow of saliva." (Surg.-Maj. R. L. Dutt, M.D., Pubna.)

"The rhizome is emetic, nauseant, antispasmodic, carminative, stomachic, stimulant, and insecticide. As an emetic it is more-nauseant and depressent than Ipecacuanha, and it is therefore useful in most of the diseases in which the latter is indicated, including dysentery. It is one of the two vegetable drugs in this country which act efficiently as emetics in so small a dose as 30 grains. It should not be used in more than 35 grains, and in 40 grains its action is very violent and obstinate. It is a good remedy in asthma, to relieve which, it should be first used in pretty large or nauseant doses (15 to 20 grains) and then repeated every 2 or 3 hours in smaller or expectorant doses (10 grains) till relieved. Among other diseases which are most benefited by this drug are bronchial catarrh, hysteria, neuralgia, and some forms of dyspepsia. The rhizome can also be used in the form of a tincture or an infusion." (Hony. Surg. Moodeen Sheriff, Madras.)

"The rootstock is burnt to charcoal, then pulverised. 10 to 20 grains of this powder mixed with water is given to counteract

the effect of croton. Is considered as an antidote in cases of croton-poisoning." (Surgeon W. A. Lee, Mangalore.)

"The burnt root acts as an astringent in infantile diarrhoea." (Asst. Surg. Ruthnam T. Moodelliar, Chingleput.) "In 3-grain doses it is very effectual in relieving the colic of small children." (Surg.-Maj. John North, Bangalore.)

"In Western India it is used externally as an application on bruises and rheumatism rubbed up with the spirits made from the Cashew-nut fruit." (Surg.-Maj. C. T. Peters, South Afghanistan.)

Powdered rhizome is used for removing fleas from water in which the rhizome is steeped for a day or more, and is given to fowls for the same purpose (K. R. K.).

Gildemeister and Hoffman (Volatile Oils (written under the auspices of Schimmel & Co.), 302) say that though the oil has been repeatedly examined no satisfactory insight into its chemical nature has been obtained. It is used in 'the manufacture of liquors and of snuff,' but is less in demand than formerly for medicinal purposes. Native Medical practitioners consider the rhizome in large doses an emetic, in small doses tonic or stomachic and carminative. It is prescribed in cases of fever, rheumatism and dyspepsia, as well as for flatulence even in infants. It is also a pleasant adjunct to tonic or purgative medicines, and as an aromatic stimulant is recommended for catarrh and distressing coughs. Dr. Childe, Second Physician to the Sir Jamsetji Jijibhai Hospital, Bombay, tried an authentic tincture for malaria, dyspepsia, dysentery and chronic bronchitis, and after careful experiment pronounced it inert. Linschoten, who studied the cultivation of sweet-flag in Gujarat and Deccan (A. D. 1598), mentions a preparation called arata (a mixture of the rhizome of sweet-flag with garlic, cumin seeds, salt, sugar and butter) which was used as a strengthening medicine for horses. Nicholson (Man. Coimbatore, 247) refers to its use in the treatment of foot and mouth disease. [Cf. also Taleef Shereef (Playfair, transl.) 1833, 34.]—(Watt's Commercial Products of India, p. 24).

The following constituents have been recognised in the essential oil of *Acorus calamus* :—Free normal heptylic and palmitic acids, eugenol, asaryl aldehyde, esters of acetic and palmitic acids, the crystalline body, $C_{15}H_{26}O_2$, m. pt. $168^{\circ}C$. named Calameone and asarone, $C_{12}H_{16}O_3$. Asarone forms a solid compound with phosphoric or arsenic acid, in the same manner as cineol (eucalyptol). During the reaction it becomes polymerised, forming parasarone $(C_{12}H_{16}O_3)_3$, a product which becomes transparent and vitreous at $173^{\circ}C$., and melts at $203^{\circ}C$., and is readily soluble in most organic compounds.—J. S. Ch. I, 15-10-1904, p. 949.

N. O. CYPERACEÆ.

1324. *Kylinga triceps* Rottb., H.F.B.I., VI. 587.

Sans.:—Nirvisha.

Vern.:—Nirbisi (H.); Svetagothubi, nirbishi (B.); Mottenga, peemottenga (Mal.); Mustu (Mar.).

Habitat—From N-W. India and Sind to Bengal, Burma and Ceylon.

Leaves as long as (rarely longer), but usually shorter than, the stem, $\frac{1}{4}$ – $\frac{1}{2}$ in. broad, linear, acute. Spikes ovoid-oblong or subcylindric, usually 3 together (rarely solitary), the middle one the largest, $\frac{1}{2}$ – $\frac{1}{4}$ in. in diam.; rhachis clothed, after the fall of the spikelets, with the persistent lower glumes; bracts beneath the head 3-4, leaf-like, up to 3 in. long. Two lower glumes hyaline, the lowest lanceolate, acuminate, $\frac{1}{2}$ in. long, the second lanceolate or suborbicular, the third and fourth herbaceous membranous, green, not speckled with brown, ovate-lanceolate, obtusely apiculate, strongly nerved, the uppermost (fourth) rather the longest, $\frac{1}{12}$ – $\frac{1}{10}$ in. long. Stamens 2. Nut oblong or ellipsoid-oblong, yellowish-brown, much compressed, $\frac{1}{16}$ in. long; style with 2 filiform stigmas, together nearly as long as the nut. (Cooke).

1325. *K. monocephala*, Rottb. H.F.B.I., VI. 588, Roxb. 61.

Habitat:—Common throughout India.

Sparsely hairy, stems 2-12 in., usually solitary, erect from a creeping rootstock. Leaves shorter than the stem, $\frac{1}{10}$ – $\frac{1}{8}$ in. broad. Spikes solitary rarely, two or three, the lateral very small, medium $\frac{1}{4}$ – $\frac{1}{2}$ in. diam; rhachis naked or pitted after the fall of the spikelets, the lowest glumes being for the most part deciduous; bracts long, narrow; spikelets $\frac{1}{10}$ in., 1-fid; glumes: I, lanceolate, very variable in length and venation acuminate, with sometimes a capillary point. II, broadly ovate, tip rounded, veins few. III and IV, green, sparingly speckled with brown, cuspidately acuminate, keel dorsally winged about the middle, wings spinulose, veins 6-8 in each, upper longest, more or less

falcately incurved, anthers small. Nut obovoid or oblong, apiculate pale red-brown, style longer or shorter than the nut. Flowers all the year round. The wings of the two upper glumes sometimes undeveloped, but the keel is always spinulose, and the species may always be recognized by their glumes having their tips narrowed with long cusps. (Trimen.)

Uses :—The two above-mentioned plants are the Nirvisha of Sanskrit medical writers, who describe them as antidotal to certain poisons. Rheede describes *K. triceps* and *K. monocephala* as having similar properties, and states that the former plant is called Coquinho by the Portuguese. In Malabar, a decoction of the roots is used to relieve thirst in fevers and diabetes, and oil boiled with the roots to relieve pruritus of the skin. He also states that they distil an oil from the roots, which is of a dark yellowish-green colour, pleasant odour and pungent taste, and which is used for the same purposes as the decoction and to promote the action of the liver.

Irving states that *K. monocephala* is used at Ajmere as an antidote like zedoary, and Roxburgh notices its use as an antidote in Bengal. These plants have the odour, and apparently all the qualities, of *Cyperus rotundus*.

1326. *Juncellus inundatus*, Clarke, H.F.B.I., VI. 595.

Syn. :—*Cyperus inundatus*, Roxb. 68.

Vern. :—Pati (B. & H.).

Habitat :—In abundance on the low banks of the Ganges and near Calcutta. Bengal, from Sylhet to the Sea.

A stout perennial. Root jointed, creeping, stoloniferous. Stem 2-4ft. high, about as thick as the finger, triquetrous. Leaves numerous, radical surrounding the base of stem, most deeply channelled on the inside, and keeled on the back. Rhachis of spike glabrous, 1-2in. universal involucre compound of 4-5 leaves of very unequal lengths, the largest being 2ft. or more long, and the shortest as many inches; partial involucre subulate. Umbel decomposed, erect, about a span long.

Spikelets often $\frac{1}{8}$ – $\frac{1}{2}$ in. apart, sessile, diverging, lanceolate, rigid, obtuse. Glumes obtuse, 5-7-nerved. Stamens 2:—style bifid. Nut longer than half the glume, more or less compressed, not equilaterally trigonous, obcordate, smooth.

Uses:—The tubers are used as a tonic and stimulating medicine. (Irvine.)

1327. *Cyperus scariosus*, C. Br. H.F.B.I., VI. 612.

Syn.:—C. Pertenuis, Roxb. 66.

Sans.:—Nagar-mustaka.

Vern.:—Nâgar-mothâ (H.); Nagar-mutha (B.); Nâgar-motha (Dec.); Muttah-kâch (Tam.); Tungo-gaddala vîm (Tel.); Vomoni (Burm.); Lawala (Mar.); Kora-kizhanna (Mal.); Konuari-gadde (Kan.); Soadekâfi (Arab.); Mushki zamen (Pers.).

Habitat:—Bengal, Pegu. Common in Sunderban.

Tall, glabrous, stolons slender, $\frac{1}{8}$ –2 by $\frac{1}{16}$ in., clothed by elliptic acute lax striate concolorous scales $\frac{1}{8}$ in. long. Stems 16-36 in. long; at top $\frac{1}{2}$ – $\frac{1}{16}$ in. in diam. slender; triquetrous. Leaves variable, usually short (less than $\frac{1}{3}$ stem), sometimes much longer, sometimes 0, narrow, weak. Umbel thin; rays slender, sometimes up to 3 in. long, sometimes not $\frac{1}{4}$ in.; contracted. Bracts nearly always as the leaves, i.e., hardly any when leaves short, exceeding inflorescence when leaves longish. Spikelets linear pale straw colour. (C. B. Clarke.)

Uses:—The root is officinal, and considered cordial, stomachic, and desiccant, and is used for washing the hair. Also regarded as diaphoretic and diuretic. The root is given in conjunction with Valerian in cases of epilepsy. The root is astringent, useful in diarrhœa. A decoction is used in gonorrhœa and also in syphilitic affections. (Dr. Peacock in Watt's Dic.)

In the Concan, Nâgarmoth, *Solanum indicum* *Tinospora cordifolia*, Ginger and Embelic myrobalans, of each 2 tolas, are powdered and divided into 5 parts, and one part taken daily in decoction with a little honey and long pepper as a febrifuge. In dysentery, Nagarmoth, Mocharas, Lodhra, Daitiphul (*Woodfordia floribunda* flowers), unripe Bael fruit, and the seeds of

Holarrhena antidysenterica are ground with whey and molasses and given in 6 massa doses. In famine seasons Nagarmoth has proved a valuable resource to the poor. (Dymock).

1328. *C. rotundus*, Linn. H.F.B.I., VI. 614.

Syn.:—*C. hexastachyus*, Rottb. Roxb. 66.

Sans.:—Mustâgundrâ, bhadramuṣṭi, mustakka, dhanakûṭa.

Vern.:—Mustâ, barikmoth, kore-ki-jhâr (H.); Muthâ, mothâ, (Beng.); Batha-bijir (Mundari); Utrubanda, (Uraon); Tandi-sura (Santal); Bimbal (Mar.); Motha (Guz.); Koraikilangu, tulam, (Tam.); tunga-muste, mustakamu, (Tel.); koranari gadde, tungahullu (Kan); Kalanduru (Sing.).

Habitat:—A very common and troublesome weed in Ceylon. A pestiferous weed all over India. The tubers yield a perfume.

Perennial herbs flowering all the year. Rootstock small, tuberous, stoloniferous. Stolons elongate, slender, bearing ovoid, hard, tunicate, black, fragrant tubers $\frac{1}{3}$ -lin. diam. root-fibres wiry, covered with flexuous root-hairs. Stems subsolitary, 6-24in., slender, trigonous below, triquetrous above, base sometimes tuberous. Leaves subradical, shorter or longer than the stem, narrowly linear, $\frac{1}{2}$ - $\frac{3}{4}$ in. broad, finely acuminate, or narrowed from the middle to both ends, flat, flaccid, 1-veined. Umbel simple or compound, primary rays 2-8, unequal, very slender, bearing short spikes of 4-10 slender spreading red-brown spikelets (inflorescence sometimes, contracted into a head; bracts 3, longest up to 7in.; spikelets $\frac{1}{2}$ -1 by $\frac{1}{8}$ in., linear, acute, slightly compressed, 10-20-fid; pale or dark red-brown; rhachilla very slender, wings elliptic; glumes about $\frac{1}{15}$ - $\frac{1}{10}$ in., closely or loosely imbricate, suberect, ovate, obtuse, dorsally green, hardly keeled, streaked with red-brown, 5-7-veined, sides broadly membranous, margins and tip narrowly scarious; stamens 3, anthers long, narrow muticous. Nut $\frac{1}{4}$ the length of the glume, obovoid or oblong, obtuse, trigonous, black, opaque, granulate, style shorter than the nut. Stigmas three, capillary. (Trimen.)

Uses:—Roots are used medicinally as a diaphoretic and astringent. Stimulant and diuretic properties are also attributed to them. They are further described as vermifuge. In native

practice they are held in great esteem as a cure for disorders of the stomach and irritation of the bowels. The bulbous roots are scraped and pounded with green ginger, and in this form, mixed with honey, they are given in cases of dysentery in doses of about a scruple. (Taylor's Med. Top. of Dacca.) In the Concan, the fresh tubers are applied to the breast in the form of *lep* as a galactagogue. (Dymock.) The roots are in Chutia Nagpur used in fever. (Campbell.)

Arabian and Persian writers describe the drug as attenuant, diuretic, emmenagogue and diaphoretic. They state that it is prescribed in febrile and dyspeptic affections, and in large doses as an anthelmintic, and externally as applied to ulcers or used as an ingredient to warm plasters. (Dymock.)

1329. *C. esculentus*, Linn., H.F.B.I., VI. 616.

Vern. :—Kaseru, dila (Pb.).

Habitat :—From the Punjab to Nilgiri Mounts scattered, but not common.

Stem at base erect. Stolons lateral, long, very slender, with small pale scales, often disappearing after the tubers are formed; tubers (ripe) woody; more regularly zoned than those of *C. rotundus*. Leaves and bracts long. Spikelets yellow or yellow-brown. Glumes over nearly their whole breadth plicate-striate; (otherwise as *C. rotundus*). Glumes in fruit slightly rigid, so that they are less closely imbricated (than in *C. rotundus*), the spikelets more turgid. So close to *C. rotundus* that it is much mixed with it in many herbaria. (C. B. Clarke.)

Use :—In the U. P. the root is officinal as kaseru (Stewart).

It so closely resembles *C. rotundus* that it is highly probable the reputed discoveries of it in India and elsewhere are in some instances at least due to mistaken determinations. It has, however, been recorded as found in one or two localities in the Punjab and in the Nilgiri hills, but nowhere common. It thus no doubt exists in India, but until fresh investigations have been made it is perhaps desirable to leave the matter in this position. Repeated efforts have, however, been put forth (so it has been affirmed) to introduce the cultivation of this plant, but with absolute failure everywhere. The present species, therefore, contributes no known portion of the supply of edible *Cyperus* tubers in India. Of other countries it is reported the tubers are often roasted, then ground to a powder, and used in the preparation of chufas coffee or chufas chocolate. [Cf. Kew Mus. Guide, 1895, No. 2, 59.] (Watt.).

1330. *Scirpus grossus*, Linn., H.F.B.I., VI. 659 ; Roxb. 77.

Sans. :—Kaseruk.

Vern :—Kaseru ; (H.), kesûr (B.) ; Kasarâ (M.) ; Kaserudila, (Pb.) ; Gunda tinga gaddi (Tel.).

Habitat :—Throughout India. Very common in the Konkan, principally Salsette (Thana marshes). (K.R.K.).

A very large annual aquatic or marshy herb. Rootstock stout, with thick root fibres, stoloniferous or not. Stem 6-16 ft., as thick as the little finger, triquetrous, spongy, angles smooth, sides concave. Leaves few, radical, 2-3 ft. long by $\frac{1}{2}$ in. broad, triquetrous, finely acuminate, coriaceous, margins smooth or scaberulous. Sheath long, open. Spikelets $\frac{1}{8}$ - $\frac{1}{4}$ in.; globose or globosely ovoid, dark brown, in large corymbiform decomposed terminal open or contracted umbels 3-8 in. diam. rays rigid, erect or spreading, upto 5 in. long. Rhachilla slender. Bracts very large, upto 3 ft. by $\frac{1}{2}$ - $\frac{2}{3}$ in. broad at the base, flat, leaf-like, margins scaberulous. Glumes rather loosely imbricate, membranous, orbicular, $\frac{1}{2}$ in. diam. concave, almost hemispheric, slenderly keeled above the middle, tip rounded ; hypogynous bristles, 6, or fewer, unequal, retrosely scabrid. Stamens 3, anthers linear, sub-acute. Nut $\frac{1}{8}$ in., obovoid, trigonous, dark brown or black, shining, tip conical, style slender, stigmas 3. (Trimen.)

Uses :—The root has astringent properties, and is given in diarrhœa and vomiting. (Dymock.) If in addition to its value as a delicate article of food it is really useful in diarrhœa a congee made of it with milk will be a very suitable form of nourishment in diarrhœa and vomiting. I can bear testimony to its bland and soothing properties. (K. R. K.)

Kesur is used to remove the taste of medicine from the mouth. It is chewed also for the purpose of checking sickness. I have often seen it used but I cannot say whether it acts beneficially. (Dr. R. L. Dutt in Watt's Dic.)

N. O. GRAMINEÆ.

Erect decumbent or creeping herbs, or in Tribe Bambuseæ shrubs or trees. Stem terete or compressed, jointed; internodes solid or hollow. Leaves simple, usually long and narrow, entire, parallel-nerved, with a sheathing base distinct from the blade; sheath split to the base (very rarely entire) with often a transverse hyaline erect appendage (ligula) at the union with the blade, facing the latter. Inflorescence terminal, rarely also from the upper sheaths, consisting of spicate racemed capitate or paniced spikelets. Spikelets of three or more alternate distichous bracts (glumes), of which the two lowest are normally empty, and the succeeding, if more than one, are arranged on an axis (rachilla), and are all or some of them flowering; within each flowering glume and opposite to it is an erect narrow 2-nerved scale (palea), the margins of which are infolded towards the glume and enclose at the base the true flower. Flowers uni- or bisexual, consisting of 2, rarely 3 or 6 microscopic scales (lodicules) representing a perianth, and stamens or a pistil, or both. Stamens 3, rarely 1, 2, 6, or very rarely many, hypogynous; filaments capillary; anthers versatile, fugacious, of two parallel cells, with no apparent connective; pollen globose. Ovary entire, 1-celled; styles 2, rarely 3, free or united at the base, usually elongate, and exerted from the sides or top of the spikelets clothed with simple or branched stigmatic hairs; ovule erect, anatropous. Fruit a seed-like utricle (grain) free within the fig. glume and palea, or adherent to either or both; pericarp very thin, rarely thick or separable from the seed. Seed erect; albumen copious, mealy; embryo minute, at the base of and outside the albumen; cotyledon scutelliform, bearing on its face an erect conical plumule, and descending conical radicle. (Hooker.)

1331. *Oryza Sativa*, Linn., H.F.B.I. VII., 92; Roxb. 306.

Sans :—Anna, dhânya, Tâṇḍula, vrihi; nivara.

Vern :—Châval (H); Dhân, Chaul (B); Bhât (M); Arisi

(Tam); Biyamu (Tel); Akki; Bhatta; nellu nellu (Kan); Ari (Mal).

Habitat:—Indigenous in marshes of Rajputana, Sikkim, Bengal the Khasia hills, Central India and the Circars.

Annual. Stems numerous, varying in height from 2-10 ft., lower portion floating or creeping, erect above, cylindrical, jointed, smooth, striate. Leaves with long close sheaths, the lower ones without blades; ligule prominent, often an inch in length, lanceolate, acute; blade linear, tapering, acute, 1-2 ft. long, and upwards of an inch in width, pale green, rough, edges serrulate and armed with minute forward prickles; midrib prominent. Panicles narrow, 8 in. to 1 ft. or more in length, at first erect, becoming more or less drooping as the grain ripens; rachis flexuose, angular, hispid, with tufts of soft hair at the base of the branches. Spikelets laxly disposed, stalked, 1-flowered, articulated with the swollen summit of the pedicel. Glumes small, the outer a little the longer, lanceolate acuminate, 1-nerved; pales 2, equal, longer than the glumes, boat-shaped, clothed with short bristly hairs especially at the upper part, coriaceous, persistent, pale green, becoming white, yellow, reddish-yellow or nearly black as the grain ripens; lower pale 3-nerved, blunt, acute or ending in a stiff smooth awn which often exceeds the spikelet. Lodicules 2, broad, fleshy, semi-transparent. Stamens 6, hypogynous; anthers linear, protruding from the pales when in flower. Ovary smooth, tapering; styles 2, about as long as the ovary; stigmas red, composed of rough spreading hairs. Fruit (the grain) enclosed in, but not adhering to, the persistent pales, oblong-ovoid, smooth, somewhat compressed. (Duthie).

Uses:—In his "Materia Medica of the Hindus," Dr. U. C. Dutt writes:—

"The three principal classes of rice are Sali or that reaped in the cold season, Vrihi or that ripening in the rainy season, and Shashtika or that grown in the hot weather in low lands. This last is reaped within sixty days of its sowing. The varieties of each of these three classes of rice are numerous and

confounding. Rakta sali popularly known as Daudkhani is the variety of rice that is considered superior to all others and suited for use by sick persons. The preparations of rice used in sick diet and described in Sanskrit medical works are as follows :—

यवगु, Yavâgû or powdered rice boiled with water for the use of the sick and convalescent. It is made of three strengths, namely, with nine, eleven and nineteen parts of water, called respectively Vilepi, Peya and Manda. Sometimes, instead of water, a decoction of medicinal herbs is used in preparing yavagu. Thus, for example, if it is ordered to give the patient yavagu made with ginger and long pepper, the process adopted in preparing it is as follows. Take of dry ginger and long pepper, one tola each, boil in four seers of water till reduced to two and strain. Now take nine, eleven or nineteen parts of this strained decoction and one part of powdered rice for making yavâgû of the strength ordered.

लाजा, Lajâ, (Vern. Khai), is paddy fried in a sand bath. The husks open out and the rice swells into a light spongy body. It is considered a light article of diet suited to invalids and dyspeptics.

भृष्टतण्डुल, Bhrista taṇḍula, (Vern. Muri) is rice fried in a sand bath. This is also a light preparation of rice and is given to sick persons as a substitute for boiled rice. It is also much used by the poorer classes for tiffin and early breakfast.

प्रथुक, Prithuka, (Vern. Chura). To prepare this, paddy is moistened and lightly fried. It is then flattened and husked. This preparation of rice is given with curdled milk (dadhi) in dysentery. It is well washed and softened in water or boiled before use.

पायस, Pāyasa is a preparation of rice with nine parts of milk.

तण्डुलाम्बु, Tandulāmbu is water in which unboiled rice has been steeped. This sort of rice-water is sometimes prescribed as a vehicle for some powders and confections."

Boiled rice, when hot, or if not so, made hot by steeping it in boiling water for sometime, has been used for making poultice as a substitute for linseed meal or flour.

Regarding the use of rice in the treatment of Diabetes, see my brochure "Diabetes and its Dietetic Treatment," (8th Edition, 1917). B. D. B.

During the expedition to Egypt the soldiers were fed almost exclusively on rice and their health suffered in no way. It transports easily, and keeps well as shown by analyses after 12 years, and is therefore an advantageous food material in times of peace and war.

Decorticated rices from the principal localities, Carolina, India, Java, Japan, Piedmont, Saigon (Cochin-China), show a percentage composition varying between the extremes quoted below :—

		Water.	Proteids.	Fat.	Amyloids.	Fibre.	Ash.
Maximum	...	16.00	8.82	.75	81.35	.42	.58
Minimum	...	10.20	5.50	.15	75.60	.18	.42

Crude rices contain a higher proportion of nitrogenous and fatty substances and ash, the limits being as follows :—

		Water.	Proteids.	Fat.	Amyloids.	Fibre.	Ash.
Maximum	...	13.30	9.05	2.50	75.60	2.38	2.20
Minimum	...	11.20	6.18	1.85	73.85	.03	1.20

Balland found that there was no connection between the size of the grain and the proportion of nitrogenous matter, and demonstrated from his analyses that rice has more value as a food than is commonly supposed.

The proteins or albuminoids of rice have recently been studied by O. Rosenheim and S. Kajuria. These chemists find 7 per cent. of total protein present in rice, of which 0.14 is a globulin, 0.04 an albumin, and the remainder a protein which like the glutenin of wheat is soluble in dilute alkali. The name oryzegenin is suggested for it.

Unmilled rice contains between 2 and 3 per cent. of oil, but in the process of polishing most of this oil is removed with the aleurone layer. The bran from rice mills in Rangoon and elsewhere contains a considerable amount of oil which frequently amounts to 20 per cent., and for this purpose is exported from India to Europe for supplying a material in soap manufacture. On account of the presence of an enzyme in the bran, the oil extracted has usually a high acidity. A recent analysis of rice oil has been published by M. Tsujimoto (1911) recording the following physical and the chemical characters : Specific gravity at 15°. 0.927; acid value, 34.75; saponification

value, 184.87; iodine value (Wijs), 107.6; unsaponifiable matter, 4.78. Fatty acids: melting point, 32.5°; neutralization value, 197.6; iodine value, 107.82. The approximate composition of the total fatty acids was calculated as, palmitic 20, oleic 45, isolinolic 35. (Agricultural Ledger.)

1332. *Coix Lachryma-Jobi*, Linn., H.F.B.I. VII, 100.

Sans:—Gavedhu, gavedhuka.

Vern:—Gurgur, (B.); jargadi, (Sant.); sankhru, sankhlu, gargari-dhan, kaiya, baru, dabhir, ganduta, garun, kasei, gulbigadi, gurlu, (H.); sanklu, (P.); Ranjondhala; (Mar.) kasai, (Guz) koamonee, (Assam), sikra kraou, koa sangti, (Naga); jhonki, (Cach.); mim, (Lush.); chang-mim-khombi, the edible form being simply nim (Manipur); gyeik aing, (Bur.); kukirrindi karibu, (Sing.);

Habitat.:—Inhabits ditches and rice-grounds in Bengal the Konkan and Deccan and throughout the hotter and damp parts of India.

An annual, stem 3-5 ft. or more, stout, rooting at nodes, internodes smooth, polished, leaves 4-18 by 1-2 in., narrowed from a broad cordate base to an acuminate tip, smooth on both surfaces, margins spinulosely serrate, midrib stout, veins many, very slender, sheaths long, smooth, ligule a very narrow membrane. Raceme 1-2½ in. long, nodding or drooping from very long penduncles. Rhachis within the bract slender, above it stout, notched at nodes. Male spikelets subsecund imbricating in pairs, very variable in size ¼-¾ in. long. Glumes 4; I and II subequal, empty, rigid, or herbaceous; I keeled along the inflexed margins; III and IV hyaline, paleate, triandrous or empty. Anthers orange-yellow. Fruit from broadly ovoid to globose, ¼-½ in. diam; pale bluish grey, polished, osseous.

Uses:—A Missionary, writing of Tonkin to M. Romanet du Caillaud, said that Job's tears made a refreshing drink was a good blood purifier and excellent diuretic. The gruel prepared from the ground seed he observed as also Eau de Larme-de-Job was extensively employed in the summer to cool the body. By the Tonkin people it is spoken of as the "grass of life and healte"

is believed to neutralise' the miasma of the air and to purify water when boiled like tea with a small quantity of Coix flour and set by to cool before being used. In India Coix can hardly be said to enjoy any reputation for medicinal virtues. The Rev. Dr. Campbell tells us that among the Santals the root is given in strangury and in the menstrual complaint known as silka. Dymock (Veg. Mat. Med.) says the seeds are sold in the drug shops of Bombay under the name of kassgi bij. The Pharmacographia Indica says that the wild form only is used medicinally and that it is considered strengthening and diuretic. (Watt).

The following detailed analysis gives the composition of the grain in 100 parts, as published by Professor Church and subsequently by the Haarlem Museum authorities, by Mr. Hooper of the Indian Museum Report and by Drs. Paton and Dunlop in The Agricultural Ledger No. 6 of 1904, page 50.

	Professor Church.		Haarlem Museum, 1901 (cultivated grain).	Indian Museum, 1901-02 (cultivated grain).	Paton and Dunlop, 1904 (wild plant).
	1886 (wild plant).	1901 (cultivated grain).			
Water ...	18.2	14.8	13.91	8.00	10.74
Albuminoids...	18.7	16.6*	21.72†	22.46	18.81
Starch ...	58.3	60.1	55.29	61.82	59.55
Oil ...	5.2	5.8	1.30	4.92	6.2
Fibre ...	1.5	0.9	1.48	.70	1.28
Ash ...	2.1	1.8	1.79	2.10	3.4

1333. *Zea Mays*, Linn., H.F.B.I., VII. 102.

Vern :—Makka, Bhutta (H).

Habitat :—Cultivated throughout India.

A tall annual grass. Stems 4-10 ft. high, smooth, striate, solid, the central portion soft and spongy. Leaves numerous, close together; sheaths large and full, somewhat compressed, auricled at the base, upper part hairy; ligule short, truncate, torn; blade of leaf 1-1½ ft. long, linear lanceolate, acute, smooth; midrib prominent below; margins wavy, ciliate. Flowers unisexual; spikelets monœcious, 2-flowered; male spikelets many, arranged in pairs on the spike-like branches of a large terminal drooping panicle; glumes 2, about equal, tinged with

* 2.66 nitrogen.

† 3.47 nitrogen.

purple; pales 2, nearly equal, falling short of the glumes, lower 3-nerved, upper 2-nerved and with inflexed margins; lodicules fleshy, truncate; stamens 3, protruded; female spikelets nearly sessile, closely arranged in pairs on a thick spongy axis, forming a compact cylindrical spike surrounded at the base by broad imbricated bracts, upper flower of spikelet barren; glumes 2, broad, thick and fleshy at the base, the lower emarginate, ciliate, the upper truncate; pales 2, lower broad and blunt, the upper much longer, closely adhering to the ovary; lodicules none; ovary sessile, ovoid, styles very long, filiform, drooping. Fruit (the grain) roundish or reniform, compressed, smooth, shining, yellow, white, red or spotted. (Duthie.)

Uses:—It is considered by Mahomedan physicians to be resolvent, astringent, and very nourishing; they consider it to be a suitable diet in consumption and a relaxed condition of the bowels. In Europe it is much used as a valuable article of diet for invalids and children under the names of *Polenta* (Maize meal) and *Maizena* (Maize flour). In Greece the silky stigmata are used in decoction in diseases of the bladder, and have lately attracted attention in America under the name of *Corn silk*, of which a liquid extract is sold in the shops as a remedy in irritable conditions of the bladder with turbid and irritating urine; it has a marked diuretic action. The meal has been long in use in America as a poultice, and gruel is also made of it. In the Concan an alkaline solution is prepared from the burnt cobs and is given in lithiasis.

In the United States for starch manufacture from maize it has been found desirable to get rid of the oily embryo—this is done by machinery. The embryo is too rich for feeding stock unless the oil is removed—this is done in the hydraulic press, and the cake when ground into meal is very valuable as a food for stock. The oil promises to be useful for medicinal purposes instead of olive oil.

Chemical composition.—The average results of the analysis of three varieties of maize in an undried state by Polson, yielded in 100 parts, 54.37 starch, 8.83 nitrogenous substance, 4.50 fat, 2.70 gum and sugar, 15.77 cellulose, 12.16 water, and 1.67 ash. Poggiale found on an average in 160 parts of the dried grain, 64.5 starch, 6.7 fat, and 9.9 nitrogenous substance. Church found it, to

contain water 12.5, albuminoids 9.5, starch 70.7, oil 3.6, fibre 2.0, ash 1.7. American grain contained 1 per cent. more fat than Indians.

In the unrefined state the oil has a specific gravity of .916 at 15°C., the elaidin test shows the presence of a large quantity of olein. Maize oil is of a pale yellowish-brown colour, with an odour and taste like that of freshly ground corn meal; it belongs to the non-drying group of the vegetable oils, does not easily become rancid, and has no purgative action. With alkalies it forms a white soap; it contains fatty acids (free) 0.88, total fatty acids 96.75 per cent., mucilaginous bodies 1.34. The loss sustained by purification is under 5 per cent. (*J. U. Lloyd, Amer. Journ. Pharm., July 1888.*)

1334. *Saccharum officinarum*, Linn., H.F.B.I., VII. 118; Roxb. 97.

Vern.:—Ukh, gannâ, ikh, nai shakar, rikhû, kumad, kusiyâr, katârî (H.); Ik, âk, ûk, kûshiar, pûri, kullûa, kajûli, (Beng.); Akh, ikshu (Sant.); Tû (Newar); Ghenra (Parb.); Uk, akali ehaku (Nep.); Aku (Ur.); Shakar surkh, khand, ganna, kamând, paunda, ikh (Pb.); Kamand (Sind); Gândâ, Sherdi, aos, ûs, kabbu (Mar.); Sheradi, nai-sakar, uns (Guz.); Karûmbû (Tam.); Cheruku, charki, ârukanupula-krânuga, (Tel.); Khabbu, basari-mara (Kan.); Karinpa, tebu (Mal.).

Habitat:—Cultivated throughout India.

A large perennial grass. Stems many, 6-12ft. high, thick, solid, jointed, polished, yellow purple or stripped; lower internodes short with fibrous roots above each joint. Leaves very large, crowded, lower ones soon falling off; ligule short, entire; sheaths about one foot in length, striate, smooth or with mealy pubescence; blade 3-4ft. long and from 1½ to 2 inches in breadth, acute, smooth on both surfaces, margins minutely serrulate, ciliate at the base; midrib prominent beneath. Panicles large, compound, drooping, feathery, of a greyish colour. Spikelets small, very numerous, 1-flowered, arranged in pairs on alternate sides of the long slender panicle branches, one stalked and the other sessile, each enveloped in an involucre of long white silky hairs; glumes 2, nearly equal, lower 2-nerved and ciliate towards the apex, upper 1-nerved; outer pale wanting, inner shorter than the glumes. Lodicules 2, free, truncate, lobed. Stamens 3; anthers linear, oblong.

Ovary smooth ; stigmas 2, densely plumose, purple. Fruit not known. (Duthie.)

Uses :—The root of the sugarcane is said to have been employed in medicine, and to have been considered demulcent and diuretic (U. C. Dutt). In Arabian works on *Materia Medica*, sugar is described as detergent and emollient, and is prescribed in doses of twenty direms. Many writers speak of it as attenuant and pectoral. It has also been supposed to have virtues in calculous complaints (Ainslie). In the Panjab, Baden Powell says, sugar is considered by the Natives to be "heavy, tonic, and aperient, useful in heat delirium and disorders of the bile and wind." In another part of his work he remarks : "In cases of poisoning by copper, arsenic or corrosive sublimate, sugar has been successfully employed as an antidote, and white sugar finely pulverised is occasionally sprinkled upon ulcers with unhealthy granulations. The Hindus set a great value upon sugar, and in medicine it is considered by them as nutritious, pectoral, and anthelmintic." The use of sugar as an antidote for arsenical poisoning is alluded to by many writers (Chisholm, Voigt, and others).

1335. *S. arundinaceum*, Retz., H.F.B.I., VII. 119.

Syn. :—*Saccharum ciliare*, Anders. *S. Sara*, Roxb. 82.

Sans. :—Gûndra, tejanaka, sharâ.

Vern. :—Sara, sarkanda, sarpat, râmsar, mûnja, sarbar, ikar patawâr Palwa (H.) ; Sar, (B.) ; Sar (Santal) ; Sarkara, sarjbar, kharkâna, kandâ (Pb.) ; Dargâ, karre (Trans-Indus) ; Sar (Sind) ; Gundra, penika, (Tel.)

The following names are also given to certain portions of the plant in different localities :—Munj (leaf-sheaths), Sar (leaves) (Pb.) ; Bind or vind, culm or flowering stem (Doab) ; Sararhi (E. Districts of U. P.) ; Senthâ, kâna, lower portion of flowering stem ; Sirki, til, upper portion of flowering stem ; Thili, upper portion of flowering stem (Lahore) ; Majori, the entire flowering stem ; Tilak, tilon, the flowers (Pb.) ; Ghua, the flowers (E. Districts, U. P.).

Habitat :—North-West India.

Stem 6—20 ft., erect from a stout rootstocks, $\frac{1}{8}$ in. diam., spongy within, internodes 6—12 in., terete, smooth, uppermost glabrous under the panicle; l. 3—5 ft. by 1—2 in. below the middle, tapering thence upwards to a long filiform point, and slightly downwards to the base, coriaceous, smooth on both surfaces, glaucous beneath, margins spinulose, midrib up to $\frac{1}{4}$ in. broad, shining, veins many, very slender, sheaths terete, coriaceous, mouth not auricled, sides bearded, ligule short, lunate, hairy; panicle 1—2 ft., dense-fl., ovoid or oblong, erect, decompound, rhachis stout, glabrous, branches half whorled, spreading in fl. ascending in fr., filiform; spikes 1—3 in., rhachis filiform, fragile, internodes $\frac{1}{2}$ — $\frac{1}{4}$ in., villous, tips obconic; spikelets $\frac{1}{10}$ in., clothed with long, soft, creamy or purplish woolly hairs up to $\frac{1}{4}$ in., long, callus very short; glume I oblong-ovate, acuminate, dorsally convex, margins incurved, 1-veined in the flexures, II lanceolate, acuminate, 1—3-veined, margins above the middle and keel ciliate with long hairs, III oblong, hyaline, obtuse, 1-veined, margin above shortly ciliate, IV smaller, lanceolate, subaristately acuminate, margins ciliate above, palea quadrate, ciliate; lodicules irregular in shape; anthers $\frac{1}{20}$ in. (Trimen.)

Uses:—The root is officinal in the Panjab, under the name of *garba ganda*. It is burned near women after delivery, and near burns and scalds, its smoke being considered beneficial. (Stewart.)

1336. *Manisuris granularis*, Linn., H.F.B.I. VII. 159.

Sans:—Palangini (Ainslie).

Vern:—Trinpali (H); Kangni (Ajmere); Dhaturghas (Udaipur); Agimali-gadi (Chanda); Ratop (Berar).

Habitat:—Throughout the hotter parts of India.

Annual, erect, much branched grass. Stems 4-30 in. high, slender, compressed softly hairy, leafy; nodes hairy. Leaves $1\frac{1}{2}$ 8 by $\frac{1}{4}$ — $\frac{1}{2}$ in., linear-lanceolate, acute or acuminate, flat, hairy on both surfaces or on the lower only with bulbous-based hairs, margins ciliate, base cordate; sheaths much shorter

than the internodes, hispid with bulbous-based hairs; ligule very short, membranous, densely ciliate. Racemes $\frac{1}{4}$ -1 in. long, resembling a string of minute beads, solitary or seemingly fascicled in the axils of the leaves, but individually from shortened axillary branches. Sessile spikelets $\frac{1}{8}$ to $\frac{1}{2}$ in. long, subglobose; callus tumid, glabrous. Glumes 4; lower invol.-glume irregularly foveolate on the back; upper invol.-glume closing the cavity of the lower floral glume, elliptic-oblong, obtuse, 1-nerved; lower floral glume hyaline, shorter than the upper invol.-glume; upper floral glume about equalling the lower, broadly ovate, obtuse; palea similar but a little shorter. Pedicellate spikelets equal in length to the sessile or longer, of 2 equal green glumes about $\frac{1}{10}$ in. long; lower invol.-glume broadly ovate or suborbicular, obtuse or subacute, 5-7 nerved, one margin narrowly folded, the other with a hyaline wing, upper invol.-glume boat-shaped, laterally compressed, the keel with a dorsal byaline ciliolate wing (Cooke).

Uses:—In Behar, it is prescribed internally in conjunction with a little sweet oil, in cases of enlarged spleen and liver (Ainslie).

1337. *Andropogon squarrosus*, Linn. f., H.F.B.I., VII. 186.

Syn.:—*A. muricatus*, Retz. Roxb. 89.

Sans:—Usir.

Vern.:—Khas, bena, panni, senth, ganrar, onei, Bâle-ke-ghâns (H.); Khas-khas, (B.); Panni (Pb.); Sirom (Sant.); Vâls (Guz.); Lâvanha (Kan.); Vettiver; romanchamver (Mal.); Vette-ver, (Tam.); Vâlâ, khasakhasa, (Mar.); Kas (Arab. & Pers.)

Habitat:—Throughout the plains of India.

Stems 2-5ft., in large, dense tufts with stout spongy aromatic roots, sparingly branched, as thick below as a goose-quill. Leaves 1-2 ft., subbifarious, narrow acute, erect, keeled, glabrous, margins scabrid; sheaths equitant, glabrous; ligule

obscure. Panicle 4-12 in., conical, erect, rachis stout and erecto-patent filiform flexuous branches glabrous or scaberulous. Spikes slender, joints and pedicels about = the sessile spikelets. Sessile spikelets grey, green, yellow or purplish, $\frac{1}{2}$ - $\frac{1}{4}$ in., slightly curved, glabrous, callus obscurely bearded; glumes I coriaceous, acute, 2-4-nerved; II coriaceous, 1-nerved, margins hyaline, keel muriccate; III lanceolate, acuminate, 2-nerved, margins inflexed ciliolate; IV = III ciliate; palea very small, obtuse, glabrous. Pedicelled spikelets like the sessile but glume I smooth, IV awnless. (Hooker).

Uses :—By Sanskrit writers the root is described as cooling, refrigerant, stomachic and useful in pyrexia, thirst, inflammation, irritability of stomach, etc. It enters into the composition of several cooling medicines. * * A weak infusion of the root is sometimes used as a febrifuge drink. Externally it is used in a variety of ways. A paste of the root is rubbed on the skin to relieve oppressive heat or burning of the body. This use of the drug appears to have been popular with the ancients. * * An aromatic cooling bath is prepared by adding to a tub of water the following substances in fine powder, namely, root of *Andropogon muricatus*, *Pavonia odorata* (bālā) red sandalwood, and a fragrant wood called *padma kashtha*. The same medicines are reduced to a thin emulsion with water and applied to the skin. (U. C. Dutt.)

An infusion of the root is given as a febrifuge and a powder in bilious complaints. It is regarded as stimulant, diaphoretic, stomachic and refrigerant. The essence (or otto) is used as a tonic. A paste of the pulverised roots in water is also used as a cooling external application in fevers.

Antispasmodic, diaphoretic, diuretic, and emmenagogue properties have been assigned to it; but beyond being a gentle stimulant diaphoretic, it seems to have no just claims to notice as a medicine. An account of the uses to which it has been applied in Europe is given by Pereira (*Mat. Med.*, Vol. ii., P., i. p. 132). Its uses in native practice are detailed in the Taleef Shereef, p. 14, No. 47. According to the analysis of Geiger,

it contains a resin, a bitter extractive, and a volatile oil. The dose of the powdered root is about twenty grains, or it may be given in infusion (two drachms of the bruised root to ten ounces of boiling water), in doses of an ounce or more. As a medicine, as far as is at present known, it is an article of very minor importance. (Ph. Ind.) "The otto is given in two minim doses to check the vomiting of cholera." (Dr. Houston.) "Used in the form of cigarettes with benzoin, it relieves headache." (Dr. Lancaster)—Watt's Dic.

1338. *A. Iwarancusa*, Jones, H.F.B.I., VII. 203.

Syn.:—*A. laniger*, Desf.

Sans.:—Lâmajjaka.

Vern.:—Lâmjak, bûr, khâwi, khoi, panni, solâra, san, ibharankusha, karan kusha, ghât-zâri Miriya ban, ganguli, bad, piriya (H. and Pb.); Kârânkusa, ibharankusha (B.); Izkir Pivala-vâla (Mar.); Pilo-valo (Guz.).

Habitat:—Dry desert tracts, Lower Himalayan tract, extending to the plains of U. P. and Sind.

Perennial, caespitose. Stems erect, thick and woolly below. Leaves smooth, glaucous, stiff; blades narrow and convolute. Panicles erect, narrowly oblong, composed of distant fascicles of spikes surrounded at the base by blunt boat-shaped yellowish sheaths. Rachis and pedicels of the awnless male spikelets densely clothed with white hairs. Flowering glumes of hermaphrodite florets minute, transparent, bidentate, and with a very slender bent awn from between the teeth. (Duthie.)

Uses:—Used to purify the blood, and in coughs, chronic rheumatism and cholera. It is recommended as a valuable aromatic tonic in dyspepsia, especially that of children; it is also used as a stimulant and diaphoretic both by natives and Europeans, in gout, rheumatism and fever. (Baden-Powell.)

The Arabian and Persian physicians describe Idkhir as hot and dry, lithontriptic, diuretic, emmenagogue, and carminative; they recommend it to be boiled in wine as a diuretic; ground into a paste it is said to be a good application to abdominal

swellings; added to purgatives it is administered in rheumatism; the flowers (calyxes) are used as an hæmostatic. (Pharmacogr. Ind. III 563.)

Chemical composition.—From 56 lbs. of the dry grass purchased in the bazar we obtained the large yield of $8\frac{3}{4}$ ozs. of essential oil; it had a specific gravity of '995 at 25° F., and rotated a ray of polarized light 8'0 degrees to the left in a column 200 mm. long. The colour was that of pale sherry. According to Schimmel & Co., the essential oil reminds one of the odour of Elemi oil. Its sp. gr. is '915, the optical rotation + 34°. It boils between 170° and 250°, and contains phellandrene (*Bericht von Schimmel & Co.*, April, 1892),—*Pharmacogr. Ind.* III, 564.

1339. *A. Schænanthus*, Linn., H.F.B.I., VII. 204.
Roxb. 93.

Syn.:—*Cymbopogon martini*, Stapf.

Vern.:—Rusâ ghâs; musel; mirchia, gand bujina; pâlâ-khari (H.); Aghyâ-ghâs; gandha hena (B.); Rânus (Pb.); Rosegavat; rohisha (Mar.).

Habitat:—Central India, the United Provinces; Panjab; the Deccan, and the Central Provinces.

Root perennial, with long wiry fibres. Culms erect, from three to six feet high, often ramous, smooth, filled with a spongy pith. Leaves very long, tapering to a very fine point, smooth in every part and of a soft delicate texture. Sheaths shorter than the joints on full grown plants, with a membranaceous stipulary process at the mouth. Panicles as in *A. Iwarancusa*; spikelets paired, but with only three joints. Flowers also paired, &c. as in the former species, only there the lowermost pair on the most sessile of the two spikelets are both male, and one of them rests upon a smooth, convex, callous receptacle instead of a pedicel. Rachis jointed, and wooly. Calyx as in *A. Iwarancusa*. Corolla one-valved, a long black awn occupies the place of the other, which has two small filaments near its base. Nectary, &c. as in the foregoing species. (Roxburgh.)

Mr. R. S. Pearson, I. F. S., F. L. S., in his "Note on the Economic uses of Rosha Grass," published in the Indian Forest Records, Vol. V., Part VII., writes—

From a commercial point of view there are two forms of this botanical

species which are popularly known as "Motia" and "Sofia," although, up to date, these have not been recognized as botanically distinct.

That there is a difference between the two well-known varieties called "Motia" and "Sofia" is evident from the inferior oil yielded by the latter, though Botanists have so far been unable to accept such a classification.

Mr. R. S. Hole, the Forest Botanist, says—

"The structure of the flowers in all the plants is practically identical and I can find no characters of importance to separate them. All the "Motia" plants, however, differ from "Sofia" as regards the wider angle which the leaf blade makes with the culm, a character which was first noticed and published by Mr. Burkill. It is doubtful, however, how far this character will prove constant and we must cultivate under varying conditions of soil and moisture the different forms here at Dehra, keep them under observation, collect the flowers at different seasons and prepare oil from them, before we can hope to define satisfactorily constant forms of value."

Uses :—The oil is regarded as officinal in the Indian Pharmacopœia. This oil, occasionally called also Oil of Namur, was first brought to notice in 1825 by Dr. N. Maxwell (Calcutta Med. Phys. Trans., vol. i., p. 367), and it was further described in 1827 by Dr. Forsyth (*Ibid.*, vol. iii., p. 213). From a series of trials instituted with it at Madras, by Drs. Cole, Kellie, and Hunter, it appears that as an application in rheumatism its efficacy is chiefly limited to recent cases. In the severer forms and in the chronic stage, the oil, even when undiluted, afforded only slight relief (see Madras Medical Reports, 1855, p. 431, *seq.*) Favourable reports of it have been received from Dr. W. Dymock, Dr. L. W. Stewart, Dr. Æ. Ross., &c. (Ph. Ind.) The oil is believed to have the property of curing baldness, and to be useful in neuralgia. "A spirit is distilled from the grass with spices, and is said to be useful in indigestion and fever" (Stewart). "The decoction of the grass is a febrifuge and I have used it in cases of cold and feverishness with benefit." (Asst. Surg. Bolly Ch. Sen in Watt's Dic.)

For further information on the uses of the oil consult Mr. Pearson's Note referred to above and also Mr. Puran Singh's Note on the Constants of Indian Geranium Oil, published in the same part of the Indian Forest Records referred to above.

1340. *A. Nardus*, Linn., H.F.B.I., VII. 205.

Syn.:—*A. nardus* proper.

Vern.:—Ganjui; ganjui-kâ-ghâs; pust-buru (H.); Kamâ-kher (B.); Ganjui; Usadhana (Mar.); Kâmâkshi-pullu; mândap-pullu; kâvattam-pullu; shunnârip-pullu (Tam.); Kâmâkshi-kasuvu; kâmanchi-Gaddi (Tel.); ganda-hanchi-khaddi (Kan.).

Habitat:—Common in the plains and lower hills of the United Provinces and Panjab; abundant about Travancore.

Rootstock stout, stem tall stout leafy, leaves long narrow, panicle large often supra-decompound oblong or subpyramidal more or less interrupted, branches loosely or closely packed erect at length often drooping, spathes laxly or closely imbricate lanceolate, proper spathes $\frac{1}{2}$ - $\frac{3}{4}$ in., spikes with 4-5 pairs of spikelets, joints and pedicels rather slender densely or laxly ciliate, sessile spikelets $\frac{1}{2}$ - $\frac{1}{3}$ in. lanceolate awned, glume 1 narrowly winged, awn long or short.

Uses:—The oil is officinal in the Indian Pharmacopœia. In its properties the oil resembles that of *A. citratus*. The infusion of the leaves in doses of $\frac{1}{4}$ to 2 ounces is used as a stomachic (Irvine's *Mat. Med* of Patna). It is used as a carminative in the bowel complaints of children (Dymock).

1341. *A. citratus*, DC., H.F.B.I., VII. 210. (*Where it is considered either A. Nardus or A. schœnanthus*) Roxb. 92

Sans.:—Bhustrina.

Vern.:—Gandha benâ (B.); Gandha trina (H.); Hirvâchah or olâchâh (Mar.); Lilichâ; (Guj.); Vashanuppulla; kurpura-pulla (Tam.); Nimmagaddi; chippagaddi (Tel.); Pârhalihulla (Kan.). Hazâr-masâlah (Per.);

Habitat:—Cultivated in gardens in India.

Uses:—"The volatile oil of this plant is officinal in the Pharmacopœia of India, where it is described as "stimulant, carminative, antispasmodic and diaphoretic; locally applied rubefacient." "In flatulent and spasmodic affections of the bowels,

and in gastric irritability, it is a remedy of value. In cholera it proves serviceable, not only by allaying and arresting the vomiting, but by aiding the process of reaction. Externally applied, it forms an excellent embrocation in chronic rheumatism, neuralgia, sprains, and other painful affections." From several trials with Lemon Grass Oil, the Editor feels justified in speaking highly of it, not only as an external application in rheumatism and other painful affections, but as a stimulant and diaphoretic when administered internally. Amongst the natives and Indo-Britons of Southern India, it is one of their most highly esteemed remedies in Cholera; and the Editor has witnessed cases in which it certainly seemed to moderate and check the vomiting, whilst it served to raise the depressed state of the constitution. It is well worthy of future trials, specially in the earlier stages of the disease. Dr. Æneas Ross reports very favourable of a warm infusion prepared by macerating about four ounces of the leaves in a pint of hot water. He states that he has used it very successfully as a diaphoretic in febrile affections, specially in weakly subjects, or when the fever is of a typhoid type. It is much used, and proves a valuable remedy, according to the same authority, in dropsical affections consequent on prolonged attacks of fever so prevalent in malarious countries." (Ph. Ind., p. 255.)

1342. *Avena fatua*, Linn., H.F.B.I., VII. 275.

Vern.:—Kuljud, ganer, gandal, jei (H.); Gozang, ganer-jei, Kâsam, yûpo, âpwa (Pb.).

Habitat:—Plains and hills of Northern India.

An annual herbaceous grass. Stems 2-4ft. high, erect, polished. Leaves few; sheaths long, smooth, striate, glaucous green; ligule prominent, broad, truncate; blade 5-6in. long, linear lanceolate, tapering from the base, pale-green. Spikelets few, laterally compressed, pendulous, arranged in large loose panicles, usually 2-3-flowered; florets widely open when in flower, one sessile, one-stalked, and a third reduced to a slender-stalked club-shaped rudiment; glumes 2, about equal, $\frac{3}{4}$ -lin.

in length, rounded on the back, thin, membranous, veined, pale-green, becoming white as the grain ripens; pales 2, shorter than the glumes, lower one faintly nerved, lanceolate, bifid, rounded on the back, smooth, afterwards hard and firm, pale-green, awned; awn proceeding from the back of the pale and $1\frac{1}{2}$ times as long, rough and twisted; upper pale rather shorter than the lower, thin, transparent, 2-toothed; margins inflexed. Within the pales are two small ciliate scales (lodicules). Stamens 3, exserted; anthers yellow. Styles 2, short feathery, white. Fruit (the grain) closely covered by, but not adherent to, the hard persistent pales, $\frac{1}{2}$ in. in length, narrowly oval-oblong, hairy, and with a deep furrow on the inside. (Duthie.)

Uses :—It is believed to produce poisonous and deleterious effects. (Stewart).

Regarding its use in the treatment of Diabetes, see my brochure "Diabetes and its Dietetic Treatment" (8th Edition, 1917). B. D. B.

1343. *Cynodon dactylon*, Pers., H.F.B.I. VII. 288; Roxb. 289.

Syn :—*Panicum dactylon*, Linn.

Sans :—Durva.

Vern :—Duba, kâli ghâs, râm ghâs, nil dub, dhupsa, hariali, (H.); Dûb, daurva, dubra, kabbar, talla, (Pb.); Burawa (Trans-Indus); Chibhar (Sind); Dub, dûrbâ, (B.); Dobi-ghâs (Santal); Durva, karala, haryeli (Mar.); Arugam-pilla, hariali (Tam.); Ghericha, haryali (Tel.).

Habitat :—Throughout India.

Stem slender, prostrate, widely creeping, forming matted tufts, with slender erect or ascending flowering branches 3-12 in. high. Leaves $\frac{3}{4}$ -4 by $\frac{1}{2}$ - $\frac{1}{8}$ in., narrowly linear or lanceolate, finely acute to pungent, more or less glaucous, soft, smooth, usually conspicuously distichous in the barren shoots, and at the base of the stems; sheaths tight, glabrous or hairy, sometimes bearded at the mouth; ligule a very fine ciliate rim.

Spikes 2-6; radiating from the top of a slender peduncle, 1-2 in. long, green or purplish; rhachis slender, compressed or angled, scaberulous. Spikelets $\frac{1}{15}$ - $\frac{1}{10}$ in. long; rhachilla produced, very slender, equalling $\frac{1}{2}$ the length of the spikelet. Invol-glumes lanceolate, acute to subulato-mucronulate, the lower $\frac{1}{25}$ - $\frac{1}{18}$ in. long, the upper slightly longer; floral glume obliquely oblong to semiovate, about $\frac{1}{12}$ in. long. Anthers oblong, $\frac{1}{25}$ in. long. Grain $\frac{1}{24}$ in. long.

Uses:—By Sanskrit writers the fresh juice of the leaves is considered astringent, and is used as a snuff in epistaxis. The bruised grass is a popular application to bleeding wounds (U. C. Dutt). In the Concan the grass is prescribed in compound decoctions with more active drugs for the cure of dysentery, menorrhagia, &c. (Dymock). A white variety, which appears to be only a diseased state of the plant, is used medicinally by the native practitioners. It is acidulous and is used to check vomiting in bilious complaints (Sakharam Arjun).

A preparation of the plant is applied by the Santals in a parasitic disease, which attacks the spaces between the toes (Revd. A. Campbell). The expressed juice is astringent and is used as an application to fresh cuts and wounds. It is also diuretic and is used in cases of dropsy and anasarca, also as an astringent in cases of chronic diarrhœa and dysentery (Dr. Thornton). The juice of the green grass is useful in catarrhal ophthalmia, is astringent, used also with much benefit in hæmaturia (Dr. Houston). Antiperiodic and used as an application in scabies (Dr. McConaghey). The decoction of the roots is used in Mysore for secondary syphilis (Dr. North). "A cold infusion often stops bleeding from piles. I generally give it with milk" (Dr. R. L. Dutt). The roots crushed and mixed with curds are used in cases of chronic gleet, dose, two fluid drams (Dr. McCloghry).—Watt's Dictionary.

The expressed juice is used in hysteria, epilepsy, insanity, (B. D. B.)

1344. *Eleusine coracana*, Gaertn., H.F.B.I., VII. 294; Roxb. 115.

Sans.:—Rājika (according to Paddington), rāji (according to U. C. Dutt).

Vern.:—Maruā, (Beng.); Kode (Sant.); Manduā, maruā, makra, rotka (H.); Mandal, chalodra (Pb.); Kodon, koda, kodra, kutra (Pb. Him.); Nangli, nachni (Sind); Nagli, nachiri (Mar.); Nāvto nāgli, (Guz.); Kayur, kelvaragū (Tam.); Tamidelu, rāgulu (Tel.); Ragi (Kan.); Kurakkan (Sing.); Mandwah (Pers.).

Habitat:—Cultivated in many parts of India.

A medium-sized annual grass. Stems several, erect, 2-4 ft. high, somewhat compressed, smooth, sulcate. Leaves with long finely sulcate sheaths; ligule shallow, densely bearded; blade 1-2 ft., linear, smooth, striate. Spikes 4-6, digitate, incurved, with usually one or more isolated ones placed lower down and representing a second verticil; spikelets sessile, 2-5 in., arranged in two rows on one side of a flattened somewhat flexuose and minutely toothed rachis. Florets sessile, distichous. Glumes lanceolate, boat-shaped, with membranous margins, keel prominent, edged with minute forward prickles; outer one about twice as long as the inner; lower pale ovate mucronate, the middle nerve forming a prominent keel; inner pale smaller, bifid, the two principal nerves keeled and armed with small prickles. Lodicules very small, entire or bilobed at the apex. Ovary smooth, shortly stalked; styles 2, with long feathery stigmas. Seed globular and about the size of mustard, dark reddish brown, transversely wrinkled, enclosed in a loose membranous pericarp. *Var. stricta* (*E. stricta*, Roxb. l. c. 115), stems 2-5 ft. high, spikes straight. (Duthie and Fuller.)

Mandua is a native of India. Its specific name is founded on the Cinghalese word *kourakhan*. There is an allied species (*Eleusine aegyptiaca*) bearing the vernacular name (*makra*), and occurring commonly throughout Upper India, which presents to a superficial examination hardly any points of difference from the cultivated plant; the seed of this wild plant is collected by the poorer classes as an unpalatable, though often very serviceable, food. The grain of the cultivated mandua is anything but popular diet. Cakes made from it are very dry eating, and little satisfies an empty stomach. For this reason it is reckoned an economic grain by the poor. But no one eats mandua cakes

by preference. It causes, peoples say, as much discomfort to the stomach as a woollen loin cloth to the skin, and hence the proverb—"Mandua ki roti, kamala ki dhoti."

Uses :—Mr. Baden-Powell mentions this plant among his drugs, but says nothing about its medicinal properties. Some assert that it is astringent.

1345. *E. aegyptiaca*, Desf., H.F.B.I., VII. 295.
Roxb. 344.

Vern. :—Makra, makri, (Hind) ; Kākuriya, (Uriya) ; Suntubukrui, (Santal) ; Cavara-pullu, [Mal (S.P.)] ; Maka-makna, tipakia (Bundel.) ; Madana, chimbari, chubrei, bhobra, madhāna, kar-madhana, (Pb.) ; Malicha, maligha, mansa, (Raj.) ; Mathna, chikāra, chōta mandiya, ute-sirkum, ute-sirla, (C. P.) ; Mhar, nāchani, natchni, nagli, raj, (Bomb.) ; Tamida, sodee, (Tam.) ; Muttengapilloo, (Tel.) ; Puta-tana, (Sing.).

Habitat :—Plentiful all over Northern India, especially on cultivated ground.

An annual, very variable in habit. Stems erect 6-18 in high, many, spreading from the crown, decumbent rooting below, then ascending and either slender, sub-simple and 12-18 in high, or very short, stout, copiously di-trichotomously branched the branches often prostrate, short, divaricate, leafy roots capillary. Leaves in tall stems 4-6 in., narrowly linear, acuminate flaccid, flat smooth in short rebush specimens, $\frac{1}{2}$ -1 in., subulate lanceolate rigid glabrous or ciliate towards the rounded, subcordate, or simple base, margins nearly smooth sheathes compressed long in slender states, very short and often inflated in short-leaved states, upper sometimes spathiform, ligule obscure, Pedicels long and slender to very short and stout sometimes shorter than the upper leaves. Spikes 2-5, digitately radiating from the top of the peduncle, under $\frac{1}{2}$ -1 in. long, $\frac{1}{4}$ - $\frac{1}{3}$ in. diam, across the spikelets, rhachis narrow, trigonous or dorsally flattened, rigid, smooth or puberulous, sometimes excurrent in a pungent mucro ; spikelets inniunrable 3-4 fid many-seriate $\frac{1}{10}$ - $\frac{1}{8}$ in. long and broad, densely crowded at right angles to the rhachis 3-4 fid very strongly compressed regid base bearded,

rhachilla hardly any glumes dinaricate I and II 1-veined I oblong cymbiform, acute or obtuse II broadly oblong trigidly cymbiform deeply 2 lobes, awned between the lobes, awn as long as the glume, or shorter, rigid, flowering glumes gibbously ovoid, tipnotched with a pungent of recurved mucro, keel smooth or minutely scabrid side veins O, palea shorter than the glume, ovate oblong obtuse or E-toothed keels scabrid or hispidulous; anthers minute; styles short seed orbicular-tubriled retaining the lyaline pari carp when ripe. (Trimen.)

Spikes green or coloured.

Uses :—A decoction of the seeds is renowned in Africa as an alleviator of pains in the region of the kidney, and its herbaceous parts are applied externally for the cure of ulcers. (Duthie in Watt's Dic.)

1346. *Hordeum vulgare*, Linn., H.F.B.I., VII. 371.

Sans :—Yava, yavaka, situshûka.

Vern. :—Jau, indarjau, yurk, jawa, sùj, (Hind.); Jab, (B.); Jowa khar, (Behari); Nas, (Bhot.); Soah, (Lassa); Tosa, (Nep.); Thanzatt, nâi, jawa, chak, jau (cut as fodder, kawfd, kasfl, pathâ, soâ, jhotak, shiroka, tro, ne, chung, lûgar, bûza, chang), (spirits=arrak), (ashes=jâwa khar), (Pb.); Jao-tursh. jao (H. hexastichum=jao-shirin), (Afg.); Java, sâtu, jav, (Mar.); Jau, jav, ymwah, (Guz.); Barli-arisi, barli-arishi, (Tam.); Pachcha yava, yava, dhânya bhedam, yavaka, barli-biyam, (Tel.); Javegodhi, (Kan.); Mu-yau, (Burm.); Shaaîr, (Arab).

Habitat :—Cultivated in the Northern India.

An erect annual grass. Stems many, quite smooth 2-3 ft, high. Leaves few, the upper one close to the spike. Sheathes smooth, striate; ligule very short; blade of leaf linear lanceolate, rounded at base tapering gradually to-apex, glaneous green Spikes linear oblong, compressed-2-2½ in. long (without the awns); Spikelets sesslets sessile, arranged in threes on two sides of a flattened rachis, lateral ones occasionally barren and rudimentary (Var. distichon); glumes 2 small setaceous, and

awn-like, enclosing the three spikelets pales 2 lower one firm, 5-ribbed rounded on the back and ending in a long stiff awn rough with forward prickles lower pale a little smaller than the upper bifid-2-veins and with the margins inflexed Lodicules 2 entense hardy stamens 3 exerted ovary hardy on top. Stigmas 2-feathers Fruit (the grain) usually with the pales adherent to it.

Uses:—Barley is demulcent, and easy of digestion, and is for these reasons much used in the dietary of the sick. In India *sattu*, or powder of the parched grains, is much employed in the form of a gruel in cases of painful and atonic dyspepsia. In European practice, Barley water, a decoction of the grain, is principally prescribed, and is valuable in cases requiring demulcent treatment. Dr. Irvine states that in Patna the ashes of the leaf are employed in the formation of cooling sherbets; and Stewart writes that the ashes of the stalks are prescribed for indigestion in the plains of the Panjab. Preparations of malt have acquired some reputation of late years in Europe and America, since they are more demulcent and nutritious than those of the unmalted barley. Malt extract may be prepared by boiling two to four ounces of the germinated and dried grain in a quart of water and straining. When hops are added, the decoction becomes wort, and acquires tonic properties, which have been found especially valuable in cases of debility following on long continued chronic suppuration.

1347. *Bambusa arundinacea*, Retz., H.F.B.I., VII.

395. Roxb. 191.

Syn.:—*B. orientalis*, Nees; *Arundo bambos*, Linn.;

Sans.:—Vansa, kichaka.

Vern.:—Bâns, kattang, magar bâns, nâl bans (H); Bâns, behur bâns (B.); Buâh (Ass.); Katanga (Kol.); Mat (Santali); Wah-kanteh (Gar.) Bariala (Chittagong); Magar, nâl (Pb.); Wâns (Guz.); Kalak, padai (Konkan); Vas (Panch Mahals); Mand gay (Bomb.); Bhâns, chânsê, bambu (Duk.); Kati wadûr

(Gond); Mulkas, kanka, bongâ, veduru, bongâ-veduru, pente-veduru (Mad. Tel.); Bidungulu (Kan.).

Habitat:—Throughout the plains and low hills of India, wild and cultivated.

Stems many, tufted on a stout rootstock, branching from the base, upto 80-100ft. high by 6-7in. diam., graceful curving nodes prominent, lowest rooting, lower emitting, horizontal almost naked shoots armed at the nodes with 2-3 stout recurved spines, sometimes an inch and more long, internodes upto 18in., walls 1-2in., thick stem, sheaths coriaceous, variable in shapes upto 12-15 by 9-12in., striate, tip-rounded, margins plaited young, orange-yellow streaked on the green or red and thickly ciliate with golden hairs, blade upto 4in., triangular, acuminate glabrous without densely hairy within, margins decurrent thickly ciliate, ligule narrow, entire or fringed with pale hairs; leaves upto 7-8 by 1in., linear or linear lanceolate, tip stiff, glabrous or puberulous beneath one or both margins scabrous, base rounded ciliate mid-rib narrow, veins 4-6 with 7-9 intermediate and a few transverse pellucid glands; leaf sheath ending in a thick callus, and short bristly auricle, ligule short; inflorescence an enormous panicle often occupying the whole stem, branchlets bearing loose clusters of pales, suberect $\frac{1}{2}$ -1 by $\frac{3}{4}$ in. lanceolate acute, glabrous spikelets glumes $\frac{1}{2}$ - $\frac{3}{4}$ in. long, ovate lanceolate acute or mucronate many veined empty 2 or 0; flowering 3-7, uppermost 1-3; male or neuter, pale sub-acute; keels 2 ciliate, lodicules ovate or obovate hyaline ciliate 1-3 veined; filaments slender, anthers obtuse yellow; ovary oval-oblong tip, hairy, style short grain $\frac{1}{2}$ - $\frac{3}{4}$ in. oblong beaked by the style base-smooth, grooved in one face. (Trimen.)

Flowers at about 30 years of age, (Brandis.) 30-40, says Kanjilal.

Uses:—In addition to the many important uses to which the bamboo is applied in tropical life, it forms by no means an insignificant article of the Indian Materia Medica. Its supposed virtues are set forth at length in the Taleef Shereef (art. Bans,

p. 28, No. 114). A belief in the emmenagogue properties of the leaves is common alike in India and China; but neither in this nor in any other character does it appear worthy of attention as a medicine. In positions where ordinary surgical appliances are not at hand, it is well to bear in mind that, with very little manipulation, splints of any required length or size can be obtained with little delay from the stems of the bamboo. For this purpose the older drier stems are to be preferred, the younger yielding somewhat on pressure. A silicious concretion, Tabashir or Tabasheer, found in the articulations of the bamboo, merits a brief notice. The most complete account of its varieties, history, formation, and properties has been published by Sir David Brewster (Philosoph. Trans., 1819, and Edin. Journ. of Science, vol. viii., p. 286); and in the same paper are embodied some learned remarks by Prof. H. H. Wilson on its nomenclature, and the uses to which it is applied by the natives, drawn from Sanskrit works. Several analyses of it have been made by Smithson, Fourcroy and Vauquelin, John, and Dr. E. Turner. The most recent and complete is that of Prof. T. Thomson, of Glasgow (Records of Gen. Science, Feb. 1836) who found its constituents to be, in 100 parts, Silica, 90.50; Potash, 1.10; Peroxide of Iron, 0.90; Alumina, 0.40; Moisture, 4.87; Loss, 2.23. It is highly prized in native practice as a stimulant and aphrodisiac; but from its composition we are warranted in believing that as a medicinal agent it is inert. (Madras Quart. Journ. of Med., April 1862, p. 245.) (Ph. Ind.)

The tender leaves of this plant used with black pepper and common salt to check diarrhoea in cattle. (Thornton, Monghyr.) The most efficacious application for dislodgment of worms in ulcers is a poultice made by pounding the young shoots of the bamboo. The juice is first poured on the vermin, and the ligneous mass is applied and secured by a bandage. (Hony. Surg. P. Kinsley, Madras.) The leaf-bud is used as decoction to encourage the free discharge of the menses or lochia when this is scanty. (Moodeliar, Madras.) Used in leprosy, fevers and hæmoptysis. (Thompson, Madras.)

Tamil practitioners say the root is diluent, the bark cures

eruptions, leaves emenagogue, and the *tabashir* is useful in paralysis and flatulence. (Balfour's Cyclopaedia Vol. I., 261.)

"*Tabashir* is a cooling medicine, generally given in fever to assuage thirst, also expectorant." (Barren, Bhuji, "Used as a medicinal ingredient in cases of diarrhoea, dysentery, &c." (Mr. Darrah, Assam.)

1348. *Dendrocalamus strictus*, Nees. H.F.B.I., VII. 404.

Syn. :—*Bambusa stricta*, Roxb. 193.

Vern. :—Bans; bans kaban; bans khurd; kopar (H.); Karail (B.); Mathan; saring; burumat (Kol); Halpa; veddar; vadur (Gond); Bas; udha (Bomb.); Bhovarlit (Mar); Kanka; Sâdhanapu vendaru (Tel.).

Habitat :—Throughout India.

Arborescent unarmed Bamboos with densely branching root-stocks. Stems 10-50 ft. by 1-3 in. diam, hollow in most climates solid in dry, young glaucous green old yellowish nodes swollen lower often rooting, internodes 12-18 in. upper branches decurved. Stem sheathes variable lower 3-12 in. glabrous or strigose with yellow brown pairs, striate top rounded ciliate, slightly auricled blade triangular hairy especially within ligule narrow. Leaves deciduous narrowed from the rounded petioled base to the twisted tip, midrib prominent nerves 3-6 pair with interposed pellucid glands. Sheath striate hairy callus prominent auricle short ciliate with flexuous deciduous hairs; ligule narrow, serrate. Panicle large leads dense, 1-1½ in. much smaller M.S. forms. Rachis smooth internodes 1½-2 in. Spikelets usually hairy, ovary stipitate turbinate style long stigma simple, feathery Grain broadly ovoid shining beaked hairy above.

Uses :—The silicious matter found near the joints is officinal, and used as a cooling, tonic and astringent medicine. The leaves are given to animals during parturition, from a supposition that they cause a more rapid expulsion of the placenta.

FILICES.*

Adiantum :—Sori marginal, varying in shape from globose to linear usually numerous and distinct, sometimes confluent and continuous; indusium of the same shape as the sorus, formed of the reflexed margin of the fronds bearing the capsules on its under side, veins free. (Beddome.)

1349. *A. lunulatum*, Burm.

Ref. :—Beddome's Handbook to the Ferns of Br. In., &c. p. 82.

Vern. :—Káli-jháut (B. and H.); Mubarak; rajhans or hansraj (Bomb.); Ghorakhuri (Bomb.).

Habitat :—Throughout North India in moist places. South India very general on the western side in the plains and lower slopes of hills. (Birdwood's catalogue of Matheran and Mahableshwar flora.) (K. R. K.)

Stipes 4-6 inches long, tufted, wiry, naked, polished dark chestnut-brown; fronds 6-12 inches long and 3 inches broad, simply pinnate, often elongated and rooting at the apex; pinnæ subdimidiate, the lower edge nearly in a line or oblique with the petiole, the upper edge rounded and like the bluntly-rounded sides usually more or less lobed; petioles of the lower ones spreading $\frac{1}{4}$ - $\frac{1}{2}$ inch long, texture herbaceous; the rachis and both surfaces naked; sori in continuous lines along the edge.

Uses :—"In Gujrat it is extensively used in the treatment of children for febrile affections. The leaves are rubbed with water and given with sugar. It is worked up with ochre and applied locally for erysipelatous inflammations." (J. Robb. Ahmedabad). "Demulcent; used externally as a cooling lotion in cases of erysipelas." (Surg. W. Barren, Bhuj, Watt's Dic.).

* Regarding Medicinal Ferns, the late Dr. M. C. Cooke wrote in the *Pharmaceutical Journal* for September 3rd, 1870 :—

"Ferns have been rather extensively employed in medicine, and some of them have acquired considerable reputation; but it is doubtful whether, with two or three exceptions, they are of any real value. Some are probably inert, others only possess properties which are more highly developed in other substances. On the whole, ferns are by no means important remedial agents, and their enumeration is more matter of curiosity than suggestive of value."

1350. *A. caudatum*, Linn.

Ref. :—Beddome's Handbook to the Ferns of Br. In., p. 83.

Sans. :—Mayúrasikhá.

Vern. :—Adhsarita-ki-jari ; Gun Kiri ; Raj-hans ; Parsiya washan (Pb.).

Habitat :—Throughout India, Ceylon and the Malay Peninsula in the plains and on lower slopes of hills.

Stipes, 2-4 inches long, tufted, wiry, spreading, dark chestnut brown, tomentose, fronds 6-12 inches long, simply pinnate, often elongated and rooting at the extremity, pinnae $\frac{1}{2}$ - $\frac{3}{4}$ inches long, $\frac{1}{4}$ inch deep, dimidiate, nearly sessile, the lower line straight and horizontal, the upper rounded, more or less cut, often deeply and repeatedly, the point usually blunt, the lower ones slightly stalked texture coriaceous, the veins prominent ; the rachis and both surfaces of the frond villose. Sori roundish or transversely oblong on the edge of the lobes. (Beddome).

Uses :—The leaves of this species are, in the island of Bourbon, used in the preparation of *sirop-de-capillaire*. (Ainslie). Used to cure cough and fever. (Ibbetson.)

Used externally as a remedy for skin diseases. (Surg. W. Barren, Bhuj.) Said to be useful in diabetes. (D. R. Thompson, M. D. Madras.).—Watt's Dict.

1351. *A. Capillus-Veneris*, Linn.

Ref. :—Beddome's Hand book to the Ferns of Br. Ind., p : 84.

Vern. :—Dûmtuli (Kashmir) ; Pursha ; Hansraj ; Mubâraka, (Hind) ; Hanspadi (Guj).

Habitat :—Western Himalaya ; Punjab ; common in South India. Near Panchgani (Birdwood's catalogue of Matheran and Mahableswar). (K. R. K.).

Stipes suberect, rather slender, 4-9 inches long, polished, blackish, naked ; fronds bipinnate, with a short terminal pinna and numerous erect-patent lateral ones on each side, the lowest slightly branched again ; segments $\frac{1}{2}$ -1 inch broad, the base cuneate, the outer edge rounded, deeply lobed from the circumference in the direction of the centre, and the lobes again bluntly crenated, lowest petioles $\frac{1}{4}$ inch long, texture pellucid herbaceous, thin ; rachis and both surfaces naked ; sori roun-

dish or obreniform, placed in the roundish sinuses of the crenations.

Uses :—In the Punjab, the leaves along with pepper, are administered as a febrifuge, and in South India, when prepared with honey, they are used in catarrhal affections (Watt).

At Colomas (in Mexico) this plant is used as a tea to relieve colic, but at Colothan it is taken as a tea for amenorrhea. This furnishes a good example of the diverse uses plants are often put to. (J. N. Rose's useful Plants of Mexico).

1352. *A. venustum*, Don.

Ref :—Beddome's Handbook to the Ferns of Br. In., p. 86.

Vern. :—Par-i-siya washan, hansrāj, Hind., in the Bazars. The Makhzan gives Kali-jhant as the Hindi name of this plant. In Bombay it is chiefly known as mubaraka. The plant is generally known as ghās in the Punjab Himalaya.

Habitat :—Himalayas up to 8,000 feet in altitude, and chiefly in the North-Western Himalayas extending to Afghanistan.

Fronds 3-4-pinnate; pinnules firm, membranaceous, glabrous, and slightly glaucous beneath, shortly petiolulate obovate-cuneate, rarely subrhomboid-acuminate, striated, the superior margin rounded, scarcely ever or but slightly 2 or 3 lobed, finely dentate-serrate, fertile lobes with 2, rarely 3 notches, each notch bearing a rather large sorus at the bottom; involucre reniform-cordate, submembranaceous; stipes and slender rachis everywhere ebeneous-glossy, glabrous. (Beddome.)

Uses :—It possesses astringent and aromatic properties, is emetic in large doses, and is a tonic and a febrifuge and expectorant. This remark is given by Mr. Baden-Powell in his *Punjab Products* under *A. caudatum*, *A. venustum* and other species, and it is probable that if all the preceding are not actually used indiscriminately or as substitutes for each other in different districts, they might easily be so, since they seem all to possess the same properties. Stewart says that "in Chumba it is pounded and applied to bruises, &c., and the plant appears to supply in the Punjab most of the officinal *hansraj*, which is administered as an anodyne in bronchitis, and is considered

diuretic and emmenagogue." Native writers do not distinguish the various species of *Adiantum*. (Dr. Dymock.)

A vapor bath medicated by a decoction from this plant is regarded useful in fever. (Dr. Emerson.) It is recommended by Hakims for hydropholia. It is resolvent and also used for the prevention of hair from falling. For internal use given in the form of a Syrup. (Asst. Surg. J. N. Dey, Jeypore). Very useful as a mild tonic, especially during convalescence from fevers (Dr. J. Anderson, Bijnor.)—Watt's Dict.

1353. *A. flabellulatum*, Linn.

Ref:—Beddome's Handbook to the Ferns of Br. In., p. 88.

Habitat:—Nepal, Assam, Khasia Hills and Sylhet.

Scales on rhizome, linear, long, lax, chestnut coloured; fronds flabellate, bipartite-pedately divided, tripinnate; secondary pinnæ lanceolate-acuminated, pinnules glabrous, subcoriaceous-chartaceous obliquely cuncate or semi-orbicular, superior base truncate, superior margin 2-4 lobed and serrate-dentate in the sterile one lobes soriferous, involucre large the breadth of the lobe, oblong straight rarely a little curved, hard coriaceous, stipes elongated ebeneous scabrous below; the rest as well as the slender rachis glossy and blobious. (Beddome).

Uses:—I was told by a Manipuri Sepoy that the root was used medicinally (Watt).

Cheilanthes:—Sori terminal or nearly so, on the veins, at first small subglobose, afterwards more or less confluent, indusium formed of the changed reflexed margin, roundish and distinct, or more or less confluent, but not quite continuous; fronds subcoriaceous in texture, mostly under 12 in. often under 6 inches long, 3-4 pinnatifid, veins free.

1354. *C. tenuifolia*, Lw.

Ref.:—Bed. Handbook. Ferns Br. I. p. 92.

Vern.:—Nanha, dodhari (Sant.)

Habitat:—Madras Presidency, common in the plains; (dry localities) and on low hills up to 4,000 ft. Bengal plains, in Assam, Chittagong, Dakka, Chota Nagpore, Khasya hills upto 35,000, ft. Sikkim and Malay Peninsula. (Beddome.)

Annual, caudex short-creeping, scaly, stipes elongated, rarely scaly; frond submembranaceous or more or less deltoid, subtripinnate, ultimate lobes of the primary and secondary divisions the largest, more or less pinnatifid; pinnules elliptic oblong or oblong lanceolate, subpinnatifid or crenate, with broad blunt teeth involucres mostly elongated, more or less confluent, more or less crenated or denticulate, sometimes transversely wrinkled; stipes and rachis purple-black, main rachis winged above, secondary and tertiary rachises all with a narrow wing-hook.

Uses:—The Revd. A. Campbell writes that the Santals prescribe a preparation from the roots of this fern for sickness attributed to witchcraft or the evil eye.

Actinopteris:—Sori linear, elongated, submarginal, indusium the same shape as sorus, folded over it placed one on each side of the narrow segments of the frond, opening toward the midrib; a single species like a miniature palm.

1355. *A. dichotoma*, Forsk.

Ref.:—Beddome, Handbook to Ferns of Br. Ind., p. 197.

Vern.:—Mor-pankhi; mor-pach, (U. P.); Mayursikha (Bomb.).

Habitat:—Throughout India, especially the Peninsula in dry rocky places below 3,000 feet elevation. Khandalla, Katraj Ghat on Mahableshtar Road. I remember to have seen this fern in the Victoria Gardens of Bombay. K. R. Kirtikar.

Stipes densely tufted, 2-6 in., long; fronds like fans, 1-1½ in. deep, composed of numerous dichotomous segments which are rush-like in texture, not more than ½ line broad, the veins few and sub-parallel with the indistinct midrib, the segments of the fertile frond longer than those of the barren one. (Beddome.)

Uses:—Used as an anthelmintic and styptic.

Dr. Dymock speaks of *A. lunatum* and *A. venustum* collectively and says:—"The native physicians consider maiden-hair to be deobstruent and resolvent, useful for clearing the primæ viæ of bile, adust bile, and phlegm, also pectoral,

expectorant, diuretic and emmenagogue. Used as a plaster it is considered to be discutient, and is applied to chronic tumors of various kinds."

Drynaria :—Fronds articulate with the caudex, with either a separate sterile frond like an oak leaf or the base of the frond pinnatifid and oak-leaf-like; veins copiously anastomosing, forming quadrate or hexagonal areoles; sori small, round or oval, numerous. (Beddome).

1356. *D. quercifolia*, Linn.

Syn. :—*Polypodium quercifolium*, Linn.

Ref. :—Bedd. Handbook to the Ferns of Br. In., p. 341.

Vern. :—Bâsingh or Wândur-bâshing (Mar.).

Habitat :—Through the Indian Plains, or very low down on mountain on trees or rock. Seen in the Court House garden of Ratnagiri on a tree in 1898-1905. Rajapur Ratnagiri District 1899-1904. (K. R. Kirtikar.)

Rhizome creeping, short, stout, densely clothed with red-brown satiny lanceolate-subulate soft scales, which have a cordate base, and are $\frac{1}{4}$ - $\frac{1}{2}$ in. long; fronds coriaceous or sub-coriaceous of two kinds, sterile ones varying in size from 3-12 inches and more long, and 7-8 inches wide, green when very young, but soon turning dark-brown, glossy, cordate-ovate variously lobate-pinnatifid, sometimes half way down to the costa; fertile ones 2-3 ft. long, long-petiolate broad-ovate deeply nearly to the rachis pinnatifid, segments 5-9 inches long, 1-1 $\frac{1}{2}$ inches wide, oblong acuminate, entire; venation manifest, costules distinct rather distant, united by transverse veins forming 4-6 primary soriferous areoles filled up with a network of small quadrangular areoles with or without free veins; sori compital small, numerous, two in each primary areole, consequently in 2 series between and parallel with the costules.

Uses :—For medicinal purposes those plants which grow upon the strychnos nux-vomica are preferred. The author of the Wanaushadi Prakâsh gives the following prescription containing Bâsingh as the best cure for phthisis :—Take 2 tolas of Kâjrabâsingh, 2 tolas of Chiretta; 1 tola Ooksi flowers

(calycopteris floribunda); 2 tolas ghâs-pitpapa (Rostelluharia procumbens); 2 tolas Ringan-mûl (root of Solanum indicum); 2 tolas Balbel-phal (small immature fruit of *Ægle Marmalos*), 2 tolas Padmini-mul (root of *Nelumbium speciosum*), 4 tolâs sonar-wel-mûl, 2 tolâs gokhru-mul (root of *Tribulus terrestris*). These nine drugs are to be powdered and divided into seven parts. For administration each part is to be boiled in 40 tolâs of water, sweetened with 2 tolâs of sugar-candy, and the decoction (Kâra) boiled down to one-sight; this is to be taken in the morning, and the mare is to be again treated in the same manner to furnish the nikâra (second decoction) or evening dose. The same prescription is recommended in hectic fever from whatever cause, and in dyspepsia and cough; during its use potatoes and indigestible vegetables are to be avoided. (Dymock).

1357. *Pleopeltis lanceolata*, Linn.

Ref:—Bedd. Handbook to Ferns of Br. Ind. &c. p. 351.

Habitat:—Nilgiris and higher mountains on the West side of the Madras Presidency; Assam and Ceylon.

Rhizome long-creeping, paleaceous, with lanceolate ferruginous scales, stipes remote, 1-2-4 inches long; fronds coriaceous, 3-9 inches long, $\frac{1}{4}$ - $\frac{3}{4}$ inch wide, lanceolate, more or less acuminate, long and gradually attenuated at the base, copiously furnished with orbicular ovate, small appressed peltate scales dark in the centre, pale in the circumference and denticulate; veins immersed indistinct, the primary veins form large obliquely elongated areoles, which include very irregular and different sized areoles, and a few free veinlets which are rarely forked; sori generally very large and often exceedingly prominent, pulvinate globose or oval, stalked scales mixed with the spore cases.

Uses:—In Mexico, a tea made from the fronds of this fern is taken to cure the itch (I. N. Rose's Notes on useful plants of Mexico.) This fern is not used in India for any medicinal purposes, (B.D.B).

Dr. M. C. Cooke, in his paper on Medicinal Ferns, published

in the Pharmaceutical Journal for September 3rd and 10th, 1870 mentions the uses of the following ferns which are indigenous to British India.

1358. *Adiantum æthiopicum*, Linn.* This is a cape species. An infusion is sometimes used as an emollient in coughs and diseases of the chest. A syrup is also prepared from it. The Basuto Kafirs, who call it "Ma-o-ru-metsoo," employ its caudex in the shape of decoction for promoting parturition.

1359. *Adiantum pedatum*, Linn.† "Canadian Maiden-hair." This is said to be the most esteemed sort of Maiden-hair, being more aromatic than the European Maiden-hair. It was formerly more employed than at present as a pectoral in chronic catarrhs. Many imaginary virtues have been ascribed to this as well as other ferns.

1360. *Asplenium adiantum-nigrum*, Linn.‡ "Black Spleenwort." The medicinal properties of this fern have been extolled by various old authors, but its use is unknown in modern practice. Ray sums up a catalogue of diseases in which it is supposed to be beneficial.

1361. *Asplenium Ruta-muraria*, Linn.§ "Wall Rue." Lightfoot says that this fern was at one time sold as an expectorant and deobstruent. It was one of the species employed as a substitute for Maiden-hair.

1362. *Asplenium Trichomanes*, Linn.|| According to Lightfoot, this fern was formerly used as an expectorant by the peasantry of Scotland. This is another of the many substitutes for the true Maiden-hair, now fallen into disrepute. Is the "Myle conday" of the Tamils.

1363. *Athyrium Filix-femina*, Bernh.¶ The rhizome of this fern has been used as a substitute for that of the Male-fern, and the same virtues as an anthelmintic have been ascribed to it. It is now generally admitted, however, that these virtues were more supposititious than real, and it has ceased to be employed.

1364. *Botrychium Lunaria*, Sw.** "Moonwort." Magical properties have been assigned to this fern. Gerarde says, "It is singular to heale green and fresh wounds. It hath been used among the alchymists and witches to doe wonders withall, who say that it will loose lockes, and make them to fall from the feet of horses that grase where it doth grow, and hath been called of them 'Martagon,' whereas in truth they are all but drowsie dreams and illusions; but it is singular for wounds as aforesaid." Ray commends its virtues in dysentery.

1365. *Cibotium Barometz*, Sw.†† Yields the "Penawar Jambie" of Sumatra. It is a similar substance to "Pulu" and employed for like purposes. This is

* Ref. Bedd. Hand-book to ferns of Br. Ind., p. 84.

† " " " " " p. 86.

‡ " " " " " p. 156.

§ " " " " " p. 156.

|| " " " " " p. 143.

¶ " " " " " p. 168.

** " " " " " p. 469.

†† " " " " " p. 24.

the Seythian Lamb of old writers, of which such marvellous stories were told.

1366. *Cibotium glaucum*, *Hook. et Arn.*; * C. Chamissoi, Kaulf.; C. Menziesii, Hook. "Pulu." All these, if really distinct, are natives of the Sandwich Islands, and yield the substance called "Pulu," which is the silky hair found clothing the rhizome and lower portion of the stalk or stipes. It has been recommended as a styptic. For further particulars, consult 'Pharmaceutical Journal,' Series 2, Vol. I. p. 501.

1367. *Davallia tenuifolia*, Sw.† In the Mauritius this forms the basis of the compound remedies used by empirics for tambave, and is often administered internally in decoction without any admixture, and also in the form of a lotion and bath.

1368. *Helminthostachys Dulcis*, Kaulf.‡ This fern, Dr. Lindley states, is regarded in the Moluccas as a slight aperient; it is used as a pot-herb, and its young shoots as asparagus.

1369. *Ophioglossum vulgatum*, Linn.§ "Adder's-tongue." "The leaves of adder's-tongue," writes Gerarde, "stamped in a stone mortar, and boiled in oyle olive unto the consumption of the juice, and until the herbes be dry and parched, and then strained, will yield a most excellent greene oyle, or rather a balsame for greene wounds, comparable to oile of St. John's wort, if it do not farre surpass it by many degrees; whose beauty is such that very many artists have thought the same to be mixed with verdigrease.

"For them that are with newts or snakes or adders stung.

He seeking out an herb that's called adder's-tongue,

As nature it ordain'd its own like hurt to cure,

And sportive did herself to niceties inure."

1370. *Osmunda regalis*, Linn.|| "Royal Fern." A native of Europe. The rhizome was formerly employed medicinally, but seems to be of little or no value. It is affirmed to be tonic and styptic, and to have been serviceable in cases of rachitis.

1371. *Pteris aquilina*, Linn¶. "Common Bracken." Native of Europe. The rhizome is said to be astringent and anthelminthic. Lindley says that it has been used with some success as a substitute for hops. Its esculent qualities must be very poor, although it is said to be sometimes eaten. The ancients used rhizomes and fronds, in decoction, in chronic disorders arising from obstructions of the viscera and spleen. It is sometimes employed abroad in dressing and preparing kid and chamois leather.

Undetermined Indian Ferns. Several ferns products employed in India have been enumerated, but at present without accurate identification. Amongst these are "Iskoolikundrion," a species of *Scolopendrium*; "Doonditarus," a species of *Dryopteris*; "Surkhus" or "Bitarus," probably a species of *Pteris*; and "Bisfaij" or "Bulookunbood," which is referred to a species of *Polypodium*."

* Ref. Bedd. Hand-book to ferns of Br. Ind. p. 24.

† " " " " p. 70.

‡ " " " " p. 467.

§ " " " " p. 464.

|| " " " " p. 450.

¶ " " " " p. 115.

FUNGI.

1372. *Agaricus campestris*, Linn.

Vern.:—Alombe, khumba (Bom.); Kagdana chhatra (Guj.); Kuti lenbhâ, Khumba (Sind). Bhecephore (Pb); Mânskhel (Kashmir); Moksha (Chamba); Khûmbah, shâmbûr, chattri (Afg. Bazar names); Kûmbh samarogh (Stewart); Herar, poisonous forms.

Habitat:—Abundant in fields in many parts of India, especially in the Panjab. Very largely prevalent in the Thana district, Salsette Island near Bombay. (K.R.K.)

Pileus 3-6 inches across, globose, then convexoplane, dry, silky, floccose or squamulose, white becoming reddish-brown when cut, gills free but rather close to the stem, $\frac{1}{4}$ - $\frac{2}{3}$ inch broad pink then flesh-colour, finally blackish-brown, sub-deliquescent; stem 3-4 inches long, $\frac{2}{3}$ -1 inch thick, subequal, white stuffed, ring median persistent, more or less torn. Spores purple-brown, elliptic, 7-9 by 6 inches.

Use.—The small dried mushrooms are officinal in the Panjab and are sold as "*Mokshai*," being regarded as alterative.

1373. *Boletus Nitus Arto-carpalis*, K. R. Kirtikar.

Vern.:—Phanasa-alombe, or vulgarly phansamba.

Habitat:—Is common on old jack trees in Bombay.

Uses.:—It is ground to a paste with water and applied to the gums in cases of excessive salivation. It appears to have much the same properties as amadon, and to be a useful styptic. It is also given internally in dysentery and diarrhoea, and applied to the mouths of children suffering from aphthæ (Dymock.)

In form this fungus resembles the hoof of a horse. Externally it is of a rich orange-brown colour when fresh, and has a sweetish, styptic taste, but when long kept it turns to a dull brown colour. The fungus consists of a number of laminae upon the under surface of which the hymenium is situated.

Colonel K. R. Kirtikar wrote the following note published at p. 73 of the First Volume of the Journal of the Bombay Natural History Society:—

"The fungus described by Dr. Dymock in his *Vegetable Materia Medica of Western India* (p. 704, 1st Edition) * is called Phanasamba in Marathi and

* P. 898, 2nd Edition, and p.

named by him as *Agaricus ostreatus*. *Agaricus ostreatus* often does grow on jack fruit-tree. But on examining genuine specimens of what is usually gathered and sold and used under the name of *Phanasamba*, it appears to be a *Polyporus* and not an *Agaricus*. (See Badham's *Esculent Fungi*, Plate X, and Mrs. Hassey's *Illustrations of British Mycology XIX*, Plate, Second Series). Dr. Saktharam Arjun, following old descriptions, also calls the fungus *Agaricus ostreatus*.

But a figure of the *Polyporus* is given in Batsch's *Elenchus Fungorum*, Plate xli, page 114, *Continuatio Secunda*. It is called *Boletus 'Niteus' or Crocatus*. It appears a proper description of thanasamba has not yet appeared. I exhibit several specimens, a general description of which will appear in my work on the Bombay Fungi, which I hope will be published at no distant date.* As this variety of *Polyporus* mainly derives its name from its habitat—growing on *Phanas* or Jack tree—I have named it *Boletus Niteus Artocarpalis*."

1374. *Mylitta lapidescens*, Horan.

Vern. :—Karom-pallagam (*Tam.*, meaning a black medicinal substance).

Habitat :—Southern India.

These fungoid bodies are like small tubers having a black, finely-wrinkled surface, and the inside is white and marked with veins, and a microscopic section shows the division of the tissue into areolæ similar to that exhibited by hyprogæous fungi. In a fresh state they have a waxy consistence, but when dry they are hard and horny. Some fresh slices immersed in glycerine for several weeks showed no crystalline or crystalloid formations, and starch was entirely absent.

Uses :—They are much esteemed by native doctors for various complaints, and they are regarded as diuretic. (*Pharmacogr. Ind.*, III. 629.)

The Journal of the Board of Agriculture for July 1917 concludes an important article on the Nutritive Value of Edible Fungi as follows :—

Summarising the results obtained from the analysis of various edible fungi, and comparing them with other foods, it is obvious that mushrooms can in no sense be regarded as substitutes for flesh-forming foods, such as meat. It may be noted that the common mushroom (*Agaricus campestris*) is richest in proteid substances of all the species examined. Even so, however, its proteid content is no higher than that of cabbage or potatoes, and in total

* Alas ! this hope of the writer was not realised.—B. D. B.

nutritive value it is far inferior to the latter on account of its poorer carbohydrate content:

Fungi, therefore, cannot be ranked with the essential foods. At the same time they are not to be looked upon as absolutely worthless. They may be made to serve a useful purpose as food accessories. Their agreeable flavour renders them especially suitable as flavourings or for use along with other more nutritious foods; variety and palatability are well-known to be important factors in the question of diet. From this point of view, however, purchased mushrooms in this country are usually not an economical addition to the menu; but where edible fungi can be gathered or obtained very cheaply they may take their place in adding variety to the diet.

Too great care cannot be exercised with regard to the use of edible fungi by persons not very familiar with the different species. The determination of species of Agarics, or gill-fungi, is by no means easy, and even mycologists of some experience may sometimes be deceived by close resemblances between edible and poisonous species. There is no test which can be used for the detection of poisonous varieties, and the soundest advice which can be given to the would-be fungus-eater is not to experiment unless he is absolutely certain of the species with which he is dealing, and never under any circumstances to eat fungi which are not perfectly sound and unattacked by insects. In cases of doubt expert advice should be asked.

As a class, they are hardly of much medicinal importance. It is better not to use them at all, since their use may lead to untoward symptoms from the difficulty of distinguishing the non-poisonous varieties from the poisonous ones.

ALGÆ.

1375. *Ulva latissima*, Linn. *The Broad Green Laver.*

Hab.—On rocks in the sea at Manora (Sind). Very widely distributed. Collected in Sind to a small extent in September and October.

Frond 4-18 inches long, widely oblong, waved, and of a green color. Edges waved.

Uses:—Said to be of value in scrofulous cases. (Murray.)

1376. *Porphyra vulgaris*, Ag. *The Purple Laver or Sea Silk.*

Hab. Manora rocks, between tide-marks.

Frond thin and membranaceous, not lacinated as in *P.*

laciniata. Length of frond 1-2 feet, breadth 2-3 inches.—Grev.

This weed is known in Sind as "Las" or "Lash," (mucilage) evidently from its containing a quantity of gelatinous matter. It is gathered just before the monsoon. Medicinally it is prescribed by native hakeems as a demucous in bad cases of scrofula, in conjunction with emulsion of almonds. As an article of diet it is said to be used in many places in the south of England and the Western Isles. (Murray.)

1377. *Fucus vesiculosus*, Linn., Eng. Bot. 1066.
Bladdery Sea-wrack.

Hab. Manora rocks.

Frond plane, compressed, linear, dichotomous, entire at the margin, coriaceous, 2-3 feet long. Root a flat, hard, disk. Air vessels in pairs, large. Receptacles in pairs often forked, terminating the branches, mostly elliptical, turgid.

The medicinal uses of this weed in Sind, or in any other part of India, are not known. The mucus of the saponaceous vesicles is said to be very effectual in removing glandular swellings; and a tincture of the vesicles to be of use as an embrocation in rheumatism. The calcined powder of the plant is said to have the same medicinal virtues, answering also as a dentifrice. It is, besides, valued in the manufacture of kelp and iodine. This fucus is said to be the basis of the popular "Anti-fat." (Murray.)

1378. *F. distichus*, Linn., Eng. Bot. t. 12. 102.
Distichous Fucus or Sea-wrack.

Hab. Manora rocks.

Bushy; frond entire, linear dichotomous, without vesicles, ribbed. Receptacles in pairs, linear, elliptic.

Medicinally this weed is considered deobstruent; and has, also like *F. vesiculosus*, been found efficacious in scrofulous swellings, and also bronchocele. (Murray.)

1379. *Laminaria saccharina*, Lam., Sweet Tangle.
Gillur ka patta. Sind and Punjab.

Hab.—In all seas.

Root of clasping fibres; stem 1 inch to a foot in length. Frond 1-10 feet in length; 1-16 inches in breadth, occasionally bullated or rugose, cartilaginous or leathery.—*Harvey*.

As an article of commerce this weed is said to find its way from the Caspian into India. In Thibet it is said by Honigberger to grow in a salt lake. When dried in the sun it exudes a whitish substance resembling Manna, hence called "Mannite,"—which Dr. Stenhouse, in his analysis of various weeds, found in the greatest abundance in this species. Medicinally this weed is employed in Sind for the cure of scrofulous affections. In syphilitic eruptions it is a favorite remedy, exhibited in the form of a syrup in conjunction with a decoction of Quince seeds (*Semina cydonia vulgaris*). In the manufacture of kelp and iodine the Laminarias are much valued. (Murray.)

LICHENES.

1380. *Parmelia Kamtschadalis*, *Esch.*

Hab.—Himalaya, Persia.

1381. *Parmelia Perlata*, *Esch.*

Sansk.—Śilā Valkā (rock-bark).

Vern.—Charéla, Charcharéla, Pathar-ke-phúl, Silá-bák (Hind.), Motha-dagada-phúl, Bárik-dagada-phúl (Mar.), Ghabilo, Chadila (Guz.), Kalpasi, Kalapu (Tam.), Ratipanché (Tel.).

Hab.—India, Europe, Africa.

Uses:—In Persia these lichens are known as Ushnah and Dowálah. The author of the Makhzan-el Adwiya states that Ushnah grows upon the oak, cypress, and other trees; that which is whitest should be preferred; it should have an agreeable odour. He describes it as astringent, resolvent, and aperient, and says that the decoction is used as a tonic and alterative; when burnt, the smoke relieves headache, the powder is a good cephalic snuff. Externally the drug has emollient and nstringent properties, and may be used in a bath or as a poultice, &c. The dry powder is applied to wounds and sores to promote granulation. Honigberger mentions the use of the drug at Lahore in disorders

of the stomach, dyspepsia, vomiting, pain in the liver or womb, induration of the uterus, amenorrhœa, calculi, and nocturnal spermatic discharges.

Ainslie (ii., 170) says: "Kull-pashie is the Tamool name given to a dried pale-coloured rock moss, which the Vytians [*Vaidyas*] suppose to possess a peculiar cooling quality, and prepare with it a liniment for the head." (Pharmacogr. Ind. III. 627-628).

"Some years since it attracted considerable attention as a diuretic, for which purpose it was first boiled in water, then beaten into a pulp or bruised in a mortar, and placed as a poultice over the renal and lumbar regions. Its efficacy in dropsical affections was attested by Dr. Stevenson, of H. M. 13th Dragoons (Calcutta Med. Phys. Trans., vol. v. p. 430), Dr. W. H. Radford (Mad. Med. Journ. 1839, vol. i. p. 18), and others (Ibid. 1843, vol. v. p. 389). According to these authorities the application of the lichen poultice was followed by marked diuresis; and dropsical cases which had resisted ordinary means, improved or recovered under its use. Dr. S. Rogers (Ibid. vol. i. p. 18), however, states that he tried it extensively at the Madras Native Infirmary, and that in every instance he failed to observe that it produced the least effect upon the kidneys. To test its alleged efficacy, it should be tried in a series of cases simultaneously with another series treated with an ordinary linseed or rice poultice; and the probability is that the continuous application of warmth and moisture by their means respectively would be found nearly equal." (Pharm. of India p. 260.)

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219. <i>Ruta graveolens</i> , Linn. var. <i>angusti-</i> <i>folia</i> ...	242	181	680. <i>obvallata</i> , Wall. ...	711	550B
<i>Saccharum</i>			N. O. SAXIFRAGEÆ ...	530	
1335. <i>arundinaceum</i> , Retz. ...	1337	1014A	479. <i>Saxifraga ligulata</i> , Wall. ...	530	401
1334. <i>officinatum</i> , Linn. ...	1336	1014B	701. <i>Screwola Kœnigii</i> , Vahl. ...	727	566
1230. <i>Saccolabium papil-</i> <i>losum</i> , Lind. ...	1245	932	135. <i>Schima Wallichii</i> , Choisy ...	156	109
N. O. SALICINÆ ...	1216		313. <i>Schleichera trijuga</i> , Willd. ...	357	262
<i>Salix</i>			884. <i>Schweinfurthia sph-</i> <i>erocarpa</i> , A. Braun. ...	926	693
1204. <i>acmophylla</i> , Boiss. ...	1217	916	1284. <i>Scilla indica</i> , Baker. ...	1299	975
1206. <i>alba</i> , Linn. ...	1220	918A	1320. <i>Scindapsus offic-</i> <i>inalis</i> , Schott. ...	1347	1005
1207. <i>babylonica</i> , Linn. ...	1220	918B	1330. <i>Scirpus grossus</i> , Linn. ...	1358	1013
1205. <i>Caprea</i> , Linn. ...	1218	917	N. O. SCITAMINÆ ...	1245	
1203. <i>tetrasperma</i> , Roxb. ...	1216	915	874. <i>Scopolia lurida</i> , Dunal ...	917	687A
1047. <i>Salicornia brachiata</i> , Roxb. ...	1068	800	N. O. SCROPHULARI- NÆ ...	922	
<i>Salsola</i>			1165. <i>Sebastiania Cham-</i> <i>zelea</i> , Muell. ...	1177	884A
1050. <i>Kali</i> , Linn. ...	1070	801B	770. <i>Secamone emetica</i> , Br. ...	809	620
1049. <i>monoica</i> , Forsk. ...	1069		331. <i>Semecarpus anacar-</i> <i>dium</i> , Linn. ...	384	279
N. O. SALVODORACEÆ ...	771				
<i>Salvadora</i>					
745. <i>Oleoides</i> , Dene. ...	772	599			
744. <i>persica</i> , Linn. ...	771	598			
<i>Salvia</i>					
1001. <i>Egyptiaca</i> , Benth. ...	1034	764B			
var. <i>pumila</i> , Benth. ...	1034				
999. <i>lanata</i> , Roxb. ...	1033	763A			
998. <i>moorcroftiana</i> , Wall. ...	1032	763B			
1000. <i>plebeia</i> , Br. ...	1033	764A			

	PAGE.	PLATE No.		PAGE.	PLATE No.
Senecio			408. <i>Sophora tomentosa</i> , Linn. ...	461	342
676. <i>densiflorus</i> , Wall. ...	709	547A	897. <i>Sopubia delphinifolia</i> , G. Don. ...	937	701A
674. <i>Jacquemontianus</i> , Benth. ...	707	544B	272. <i>Soymida febrifuga</i> , Adr. Juss. ...	319	228
675. <i>quinquelobus</i> , H. f. and T. ...	708	547B	617. <i>Spermacece hispida</i> , Linn. ...	663	509A
673. <i>tenuifolius</i> , Burm. ...	707	546	641. <i>Sphaeranthus indicus</i> , Linn. ...	680	524
911. <i>Sesamum indicum</i> , DeC. ...	952	712	Spilanthus		
Sesbania			651. <i>Acmella</i> , Linn. ...	689	532
363. <i>ægyptiaca</i> Pers. ...	417	303	652. <i>oleracea</i> , Jacq. ...	689	533A
364. <i>aculeata</i> , Pers. ...	418	304	1045. <i>Spinacia oleracea</i> , Linn. ...	1067	798
365. <i>grandiflora</i> , Pers. ...	418	305	334. <i>Spondias mangifera</i> , Willd. ...	393	281
575. <i>Seseli indicum</i> , W. and A. ...	626	481	1011. <i>Stachys parviflora</i> , Benth. ...	1041	766A
Shorea			886. <i>Stemodia viscosa</i> , Roxb. ...	928	695
140. <i>robusta</i> , Goertn. f. ...	160	113	Stephania		
141. <i>Tumbugaia</i> , Roxb. ...	162	114	46. <i>hernandifolia</i> , Walp. ...	59	40
Sida			47. <i>rotundifolia</i> , Lour. ...	60	41
150. <i>carpinifolia</i> , Linn. ...	170	121	N. O. STERCULIACEÆ ...	203	
154. <i>cordifolia</i> , Linn. ...	173	119A	Sterculia		
148. <i>humilis</i> , Willd. ...	168	119B	178. <i>foetida</i> , Linn. ...	203	144, 145
151. <i>rhombifolia</i> , Linn. ...	172	122	180. <i>scaphigera</i> , Wall. ...	205	147
152. <i>rhombifolia</i> , var. <i>re-</i> <i>tusa</i> , Linn. ...	172		179. <i>urens</i> , Roxb. ...	203	1
149. <i>spinosa</i> , Linn. ...	169	120	Stereospermum		
153. var. <i>rhomboidea</i> , Roxb. ...	173		905. <i>chelonoides</i> , D.C. ...	946	707
647. <i>Siegesbeckia Orient-</i> <i>alis</i> , Linn. ...	684	529	906. <i>suaveolens</i> , DeC. ...	947	708
679. <i>Silybum marianum</i> , Goertn. ...	710	549A	907. <i>xylocarpum</i> , Wight. ...	948	709
N. O. SIMARUBÆÆ ...	279		1171. <i>Strebulus asper</i> , Lour. ...	1183	889
Sisymbrium			Strobilanthes		
77. <i>Sophia</i> , Linn. ...	91	63A	918. <i>auriculatus</i> , Nees. ...	959	718
78. <i>Irio</i> , Linn. ...	91	63B	917. <i>calosus</i> , Nees. ...	958	717
229. <i>Skimmia laurocola</i> , Hook. f. ...	257	191	Strychnos		
Smilax			788. <i>colubrina</i> , Linn. ...	835	632
1270. <i>glabra</i> , Roxb. ...	1285	964	789. <i>Nuxvomica</i> , Linn. ...	836	633A
1271. <i>lanceifolia</i> , Roxb. ...	1285	965	790. <i>potatorum</i> , Linn. f. ...	841	633B
1272. <i>macrophylla</i> , Roxb. ...	1286	966	N. O. STYRACEÆ ...	759	
N. O. SOLANACEÆ ...	889		1048. <i>Succeda fruticosa</i> , Forsk. ...	1069	801A
Solanum			Swertia		
854. <i>dulcamara</i> , Linn. ...	891	671	804. <i>angustifolia</i> , Ham. ...	853	641A
857. <i>ferox</i> , Linn. ...	893	674	805. <i>affinis</i> , Clarke. ...	853	642A
862. <i>gracilipes</i> Dene. ...	899	677B	803. <i>chirata</i> , Ham. ...	851	641B
858. <i>indeum</i> , Linn. ...	894	675	806. <i>decussata</i> , Nimmo. ...	854	643
859. <i>Melongena</i> , Linn. ...	895	676	802. <i>paniculata</i> , Wall. ...	850	640A
853. <i>nigrum</i> , Linn. ...	889	670	801. <i>purpurascens</i> , Wall. ...	850	640B
855. <i>spiralae</i> , Roxb. ...	892	672	Symplocos		
861. <i>trilobatum</i> , Linn. ...	898	678	730. <i>cratægoides</i> , Ham. ...	759	587C
856. <i>verbascifolium</i> , Linn. ...	892	673	731. <i>racemosa</i> , Roxb. ...	760	587B
860. <i>xanthocarpum</i> , Schrad and Wendl. ...	896	677A	1314. <i>Synantherias</i> <i>sylvatica</i> , Schott. ...	1340	1000
632. <i>Solidago virga-aurea</i> , Linn. ...	674	519B	Tabernaemontana		
Sonchus			758. <i>coronaria</i> , Br. ...	796	609
697. <i>arvensis</i> , Linn. ...	565	562	756. <i>dichotoma</i> , Roxb. ...	795	608
696. <i>oleraceus</i> , Linn. ...	724	561	757. <i>Heyneana</i> , Wall. ...	796	606A
515. <i>Sonneratia acida</i> , Linn. ...	567	484	N. O. TACCACEÆ ...	1281	

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1265. <i>Tacca pinnatifida</i> , Forst. ...	1281		<i>Tribulus</i>		
430. <i>Tamarindus indica</i> , Linn. ...	482	361	205. <i>alatus</i> , Delile ...	230	169
N. O. TAMARISCINÆ	138		204. <i>terrestris</i> , Linn. ...	229	168
<i>Tamarix</i>			<i>Trichodesma</i>		
123. <i>articulata</i> , Vahl. ...	140	99	824. <i>africanum</i> , Br. ...	867	653B
122. <i>dioica</i> , Roxb. ...	139	98	823. <i>indicum</i> , Br. ...	866	653A
121. <i>gallica</i> , Linn. ...	138	97	825. <i>Zeylanicum</i> , Br. ...	867	655B
110. <i>Taraktogenos Kurzii</i> , King. ...	125	88	<i>Tricholepis</i>		
692. <i>Taraxacum officinale</i> , Wigg. ...	720	558A	685. <i>glaberrima</i> , D.C. ...	714	553
366. <i>Taverniera nummu-</i> <i>laria</i> , D.C. ...	421	307A	686. <i>montana</i> , Dalz. and Gibs. ...	714	
1218. <i>Taxus baccata</i> , Linn.	1228	925A	<i>Trichosanthes</i>		
901. <i>Tecoma undulata</i> , G. Don. ...	943	701B	529. <i>anguina</i> , Linn. ...	583	445
950. <i>Tectona grandis</i> , Linn. ...	990	735	525. <i>cordata</i> , Roxb. ...	580	442A
<i>Tephrosia</i>			528. <i>cucumerina</i> , Linn. ...	582	444
361. <i>purpurea</i> , Pers. ...	415	302B	526. <i>dioica</i> , Roxb. ...	581	443
362. <i>villosa</i> , Pers. ...	416	302	527. <i>nervifolia</i> , Linn. ...	582	444
381. <i>Teramnus labialis</i> , Spreng. ...	435	315	524. <i>palmata</i> , Roxb. ...	578	442B
<i>Terminalia</i>			<i>Trigonella</i>		
494. <i>Arjuna</i> , Bedd. ...	544	414	345. <i>occulta</i> , Delile. ...	404	290A
491. <i>belerica</i> , Roxb. ...	539	412B	346. <i>Fœnumgræcum</i> , Linn.	404	290B
490. <i>Catappa</i> , Linn. ...	538	411	193. <i>Triumfetta rhomboi-</i> <i>dea</i> , Jacq. ...	218	159
492. <i>Chebula</i> , Retz. ...	541	413	260. <i>Turrea villosa</i> , Benn.	298	216
493. <i>citrina</i> Roxb. ...	544	412A	669. <i>Tussilago farfara</i> , Linn.	704	543A
496. <i>paniculata</i> , Roth ...	548	416	<i>Tylophora</i>		
495. <i>tomentosa</i> , Bedd. ...	547	415	782. <i>asthmatica</i> , W. and A.	827	618B
N. O. TERNSTREMIACEÆ	156		781. <i>fasciculata</i> , Ham. ...	825	627
5. <i>Thalictrum foliolosum</i> , D.C. ...	4	4	N. O. TYPHACEÆ	1329	
<i>Thespesia</i>			1305. <i>Typha elephantana</i> , Roxb. ...	1329	992
171. <i>Lampas</i> , Dalz. & Gib. ...	188	135	1312. <i>Typhonium triloba-</i> <i>tum</i> , Schoot. ...	1335	998
170. <i>populnea</i> , Corr. ...	186	136	1375. <i>Ulva latissima</i> , Linn.	1396	
N. O. THYMELEACEÆ	1108		N. O. UMBELLIFERÆ	618	
990. <i>Thymus serpyllum</i> , Linn. ...	1027	760B	<i>Uraria</i>		
N. O. TILIACEÆ	212		368. <i>pieta</i> , Deso ...	423	308A
<i>Tinospora</i>			369. <i>lagopoides</i> , D. C. ...	423	308B
40. <i>cordifolia</i> , Miers. ...	49	35	<i>Urena</i>		
39. <i>crispa</i> , Miers. ...	48	34	158. <i>lobata</i> , Linn. ...	177	125
38. <i>tomentosa</i> , Miers. ...	48	33	160. <i>repanda</i> , Roxb. ...	178	127
228. <i>Toddalia aculeata</i> , Pers. ...	253	189	159. <i>sinuata</i> , Linn. ...	177	126
765. <i>Trachelospermum</i> <i>fragrans</i> , Hook. ...	804	613A	1283. <i>Urginea indica</i> , Kunth. ...	1296	974
891. <i>Torenia asiatica</i> , Linn.	932	697B	N. O. URTICACEÆ	1178	
1160. <i>Tragia involucrata</i> , Linn. ...	1173	880	33. <i>Uvaria narum</i> , Wall. ...	44	28
518. <i>Trapa bispinosa</i> , Roxb. ...	571	437	N. O. VALERIANÆ	665	
1155. <i>Trewia nudiflora</i> , Linn. ...	1165	876	<i>Valeriana</i>		
<i>Trianthema</i>			622. <i>Hardwickii</i> , Wall. ...	667	512
560. <i>decandra</i> , Linn. ...	614	472	623. <i>Leschenaultii</i> , D. C.	667	513
558. <i>monogyna</i> , Linn. ...	613	470	620. <i>officinalis</i> , Linn. ...	666	511B
559. <i>pentandra</i> , Linn. ...	613	471	621. <i>Wallichii</i> , D.C. ...	666	511A
			759. <i>Vallaris Heynei</i> , Spreng. ...	797	610
			<i>Vanda</i>		
			1229. <i>Roxburghii</i> , Br. ...	1244	931
			1228. <i>spathulata</i> , Spreng.	1243	
			<i>Vandellia</i>		
			892. <i>erecta</i> , Benth. ...	932	697A
			893. <i>pedunculata</i> , Benth.	933	697B
			609. <i>Vangueria spinosa</i> , Roxb. ...	656	502

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		No.			No.
142. <i>Vateria indica</i> , Linn. ...	163	115	687. <i>Volutarella divari-</i> <i>cata</i> , Benth. ...	715	554
<i>Ventilago</i>			416. <i>Wagatea spicata</i> , Dalz. ...	468	349
285. <i>calyculata</i> , Tulasne. ...	334	238B	269. <i>Walsura piscidia</i> , Roxb. ...	316	225
284. <i>madraspata</i> , Grætn. ...	332	238A	650. <i>Wedelia calendu-</i> <i>lacea</i> , Lees. ...	688	531
881. <i>Verbascum Thapsus</i> , Linn. ...	922	690	1098. <i>Wikstroemia indica</i> , C. A. Mey. ...	1109	
N. O. VERBENACEÆ ...	983		<i>Withania</i>		
946. <i>Verbena officinalis</i> , Linn. ...	987	732B	867. <i>coagulans</i> , Dunal. ...	906	682
<i>Vernonia</i>			866. <i>somnifera</i> , Dunal. ...	903	681
627. <i>anthelmintica</i> , Willd. ...	670	515A	512. <i>Woodfordia flori-</i> <i>bunda</i> , Salisb. ...	562	432B
626. <i>cinrea</i> , Less. ...	669	516	<i>Wrightia</i>		
<i>Veronica</i>			760. <i>tinctoria</i> , Br. ...	798	611
895. <i>Anagallis</i> , Linn. ...	936	700A	761. <i>tomentosa</i> , Roem. and Schult. ...	799	612
896. <i>Beccabunga</i> , Linn. ...	937	700B	646. <i>Xanthium stru-</i> <i>mari</i> , Linn. ...	683	528A
590. <i>Viburnum foetidum</i> , Wall. ...	639	488A	N. O. XYRIDÆ ...	1305	
391. <i>Vigna Catiang</i> , Endl. ...	447	352	1290. <i>Xyris indica</i> , Linn. ...	1305	980
<i>Vinca</i>			555. <i>Zanonia indica</i> , Linn. ...	669	468
752. <i>pusilla</i> , Murr. ...	783	605	<i>laris</i> , Lam. ...	1328	991
751. <i>rosea</i> , Linn. ...	782	604A	1333. <i>Zea Mays</i> , Linn. ...	1364	
<i>Viola</i> ...	111		<i>Zanthoxylon</i>		
101. <i>cinerea</i> , Boiss. ...	114	80A	223. <i>acanthopodium</i> , D. C. ...	250	185B
100. <i>odorata</i> , Linn. ...	112	80B	222. <i>alatum</i> , Roxb. ...	249	184
99. <i>serpens</i> , Wall. ...	111	79	227. <i>budrunga</i> , Wall. ...	252	188
N. O. VIOLACÆ ...	111		225. <i>Hamiltonianum</i> , Wall. ...	251	187
<i>Viscum</i>			224. <i>oxyphyllum</i> , Edgew. ...	250	186
1106. <i>album</i> , Linn. ...	1115	841B	226. <i>Rhetsa</i> , D. C. ...	251	185A
1109. <i>articulatum</i> , Burm. ...	1118	843	<i>Zehneria</i>		
1107. <i>monoicum</i> , Roxb. ...	1116	841A	551. <i>Hookeriana</i> , Arn. ...	606	246A
1108. <i>orientale</i> , Willd. ...	1117	842	552. <i>umbellata</i> , Thwaites ...	606	466B
<i>Vitex</i>			<i>Zingiber</i>		
961. <i>glabrata</i> , Br. ...	1002	742	1246. <i>Casumunar</i> , Roxb. ...	1259	946
959. <i>negundo</i> , „ ...	999	740A	1244. <i>officinale</i> , Roxb. ...	1257	944
960. <i>peduncularis</i> , Wall. Var. <i>Roxburghiana</i> ...	1001	741	1245. <i>Zerumbet</i> , Smith ...	1258	945
958. <i>trifolia</i> , Linn. ...	998	740B	<i>Zizyphus</i>		
<i>Vitis</i>			287. <i>glabrata</i> , Heyne ...	337	240A
297. <i>adnata</i> , Wall. ...	343	247	286. <i>jujuba</i> , Lamk. ...	335	239
303. <i>araneosus</i> , Dalz. and Gibs. ...	348	249B	288. <i>nummularia</i> , W. & A. ...	337	240B
300. <i>indica</i> , Linn. ...	346	250	290. <i>rugosa</i> , Lamk. ...	339	242
298. <i>latifolia</i> , Roxb. ...	344	248	289. <i>vulgaris</i> , Lamk. ...	338	241
304. <i>pedata</i> , Vahl. ...	349	253	N. O. ZYGOPHYLLÆ ...	229	
296. <i>quadrangularis</i> , Wall. ...	342	246	206. <i>Zygophyllum sim-</i> <i>plex</i> , Linn. ...	231	170A
301. <i>setosa</i> , Wall. ...	347	251			
302. <i>trifolia</i> , Linn. ...	347	252			
299. <i>vinifera</i> , Linn. ...	344	249A			

ERRATA.

- Page. line
- xvii. 22. (Col. 1.) *fitula* read *fistula*.
- xx. Insert *Pluchea* between lines 3 & 2 (from bottom, Col. 1).
65. 22. Add "*Uses* :—" before *Rasot* or *Rasavanti*.
66. 8. Omit "*Uses* :—".
70. 18. For *Nymphæceæ* read *Nymphaeaceæ*.
77. 33. Add (K. R. K.) after *India*.
- .. 34. Add *Habitat* :—before *Cultivated*.
93. 14. For *B. campestris* read *B. campestris*.
132. 5 (from bottom). For *Frankenia pulverulata* read *Frankenia pulverulenta*.
143. 18. Put 127 before *Garcinia*.
170. 24. For *S. caprinifolia* read *S. carpinifolia*.
172. 7 (from bottom). For *S. rhombifolia* read *S. rhombifolia*.
186. 9 (from bottom). For *Thespasia* read *Thespesia*.
206. 12 (from bottom). For *suberfolium* read *suberifolium*.
217. 1 For 912 read 192.
217. 1 For 398 " 391.
264. 1. For *Atlantia* read *Atalantia*.
279. 5 (from bottom). For *Ailanthus* read *Ailantus*.
290. Insert **N. O. Ochnaceæ**, between 16 and 17 lines.
291. Top line. For *Simarubææ* read *Burseraceæ*.
291. Add **N. O. Burseraceæ**, between lines 3 and 4.
293. Top line For *Simarubææ* read *Burseraceæ*.
295. " " "
297. " " "
300. 7 line (from bottom), for 252 read 262.
309. 10 " " for *M. azadarach* read *M. azedarach*.
313. 3 " " Add *Miq.* after *Aglais Roxburghiana* and read 555 for 553.
327. 14 line (from bottom), read *Celastrus paniculata* for *Celastrus paniculatus*.
341. 2 line (from bottom), read *Gouania* for *Gouania*.
342. 15 " for N. O. *Ampelidæ* read *Ampelidæ*.
344. 5 " Add *Roxb* after *V. latifolia*.
353. 12 " For *helicacabum* read *Halicacabum*.
371. 7 " Place, after *insignis* and read *Hook* for *Book*.
417. 9 " for *ægyptica* read *ægyptiaca*. For 14 read 114.
419. 4 line (from bottom). For 363 read 366.
- [N. B. From this, the serial numbers of plants should be corrected].
421. 17 " For *Taverniera* read *Taverniera*.
464. 2 " (from bottom). For 'worthy' and 'half' read 'woolly' and half respectively.
522. 14 (from bottom). For *Gerish* read *Geuru*.
585. 9 for *ægyptica* read *ægyptiaca*.
588. 15 (from bottom). For *Benicassa* read *Benincassa*.
632. 19 " For *Coriandrim* " *Coriandrum*.
637. 11. For 746 read 741.
652. 10 For *gummifera* read *gummifera*.
672. 8 For *Elephantopus* " *Elephantopus*.
691. 1 " *Glossocordia* " *Glossocardia*.
726. 1 " *Launea* " *Launea*.
727. 4 (from bottom) For *Goodenoviae* read *Goodenoviæ*.
821. 9 " *Rheedeii* read *Rheedeii*.
825. 20. For *Royleii* read *Roylei*.
859. Top line, for *Boarginææ* read *Boraginææ*.
881. 17 " *Campanulata* read *I. Campanulata*.

Page. line

945. 9 (from bottom). Add *DC* after *Roxburghii*.
 993. 11 (") Add *H. F. B. I. IV. 577* after *P. latifolia*, *Roxb.*
 1018. 2 (") For *Lavandula* read *Lavendula*.
 1084. 8. For *S. ægyptica* read *S. ægyptiaca*.
 1088. 1. " *Orunella* " *Brunella*.
 1088. 24 " *Carrubium* " *Marrubium*.
 1065. 16 " *C. Cotrys* " *C. Botrys*.
 1076. 20 " *P. barlatum* " *P. barbatum*.
 1078. 6 (from bottom). Omit *Brod* after *Don*.
 1080. 14. For *acuminatum* read *acuminatum*.
 1085. 17 For *Braganita* " *Bragantia*.
 1100. 7 For *Leinu* read *Reinu*.
 1103. 15 (from bottom) For *Litsia* read *Litsæa*.
 1108. 3 (") Thymelaceæ " Thymelæaceæ.
 1113. 12. For *Thumb* read *Thunb.*
 1141. 22. " *madraspatensis* " *Maderaspatensis*.
 1149. 11. " *Bunias* " *Bunius*.
 1158. 4 (from bottom). For *Crozophora* read *Chrozophora*.
 1159. 17 " Omit *Arg.* after *Muell.*
 1178. 10 " For *Huloptela* read *Holoptelea*.
 1195. 16. For *asperrisma* read *aspersima*.
 1208. 13 (from bottom) for *N. O. Juglanceæ.* read *N. O. Juglandææ.*
 1209. Top line. For *N. O. Platanaceæ* read *Juglandææ.*
 1212. 2. For *N. O. Casurineæ* read *N. O. Casuarineæ.*
 1213. 12 (from bottom). Omit *Prod* after *Don*.
 1238. 13. For *Kindley* read *Lindley*.
 1245. 13 (from bottom), for *IV* read *VI*.
 1251. Last line. For *artomaic* read *aromatic*.
 1257. 7 (from bottom). For *Zosc* read *Rosc*.
 1277. 19. For *orchiolides* read *orchioides*.
 1317. 12. " *flabellifor* " *flabellifer*.
 1328. 2. " *fascicularis* " *fascicularis*.
 1336. 12. " *Amorphophalius* " *Amorphophallus*.
 1342. 4 (from bottom). For *Aolocasia* read *Colocasia*.
 1355. 7. Omit *O.* after *scariosus*, and before *Br.*



S. M. I

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